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> For this image I wanted to try a few things that I hadn't done before – adding a more human facial structure instead of my usual visor style

Richie Jon Mason reveals how he made his stunning cover image **Page 40**

Richie Jon Mason

Personal portfolio site www.artstation.com/artist/Richenks

Country UK

Software ZBrush, KeyShot, Cinema 4D, Photoshop

Head over to p32 for an in-depth tutorial on how to create superb robot designs in ZBrush, with some extended insight into how Richie Jon Mason created his amazing cover image on p40. Hopefully these guides will help you to develop your own sci-fi style!

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Penguins Of Madagascar Page 22

Welcome

to the magazine and 100 pages of amazing 3D

Welcome to 3D Artist magazine! Do you want to design the machines of the future? Using ZBrush you can bring your futuristic designs to life, and a good place to begin is with our tutorials starting on p32. Elsewhere in the magazine, we go behind the scenes of DreamWorks' *Penguins Of Madagascar* (p22), industry experts explain how to succeed as a freelancer (p74) and Maya master Aldo Vicente walks you through accurately texturing a superbike (p42). Enjoy the issue!

Dan Hutchinson Editor in Chief

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6. The chance to see your art in the mag!

This issue's team of expert artists...

Orestis Bastounis

This month our tech expert gets his hands on the AMD FirePro W8100 GPU and puts it through its paces. Head over to p84 for his expert analysis and exclusive verdict.

Bruno Câmara

Utilising Mudbox, 3ds Max and ZBrush, Bruno looked to fantasy inspiration to create a fearsome werewolf on p52. For essential advice on sculpting, look no further.

Rainer Duda

Houdini FX wizard Rainer walks you through a step-by-step guide to advanced fluid simulations, setting up a turbulence generator along the way. Check it out on p66.

Gavriil Klimov

Concept designer Gavriil discusses the major things to bear in mind when designing sci-fi characters in 3D. Take a look at his excellent tutorial on p70.

Tom Magill

3D expert Tom Magill takes Autodesk Smoke 2015 for a test drive this month, but how does it compare to last year's iteration? Find out in his review on p87.

Richie Jon Mason

Over on p40, Richie explains how he developed an incredible cyborg using ZBrush and KeyShot. We loved the end product so much we put it on the cover! Amazing stuff.

Luis San Juan Pallarés

Have you ever wondered how to drastically improve your rigging? Luis is on hand to help, taking you on a guided tour of an intricate spine rig for a quadruped on p62.

Aldo Vicente

A veritable genius when it comes to Maya, Aldo Vicente talks you through how to create and embellish an amazing superbike on p42, across 20 in-depth steps.

David Molina Zabaleta

Also known as Caleb Nefzen, David walks you through re-creating his technical and unique cyborg project in ZBrush. Head to p32 to check out his awesome tutorial.

Sign up, share your art and chat to other artists at www.3dartistonline.com

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Image - Lorenzo Zitta

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Italian digital artist Lorenzo Zitta knows how to create thought provoking still images with LightWave 11.6. Whether the still is computer-generated with LightWave, an artful arrangement of digital photos, or a combination of the two, the composition of the scene – with its attention to detail and unusual merging of objects – demands a closer look.

"Thanks to LightWave, I can quickly test many different approaches for my projects. I love bringing models into Layout and switching on Radiosity, then start working on shading and lighting, bringing in more elements, and testing and improvising to get the look I want." - Lorenzo Zitta

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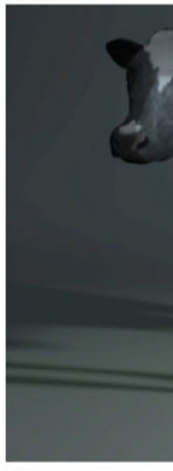

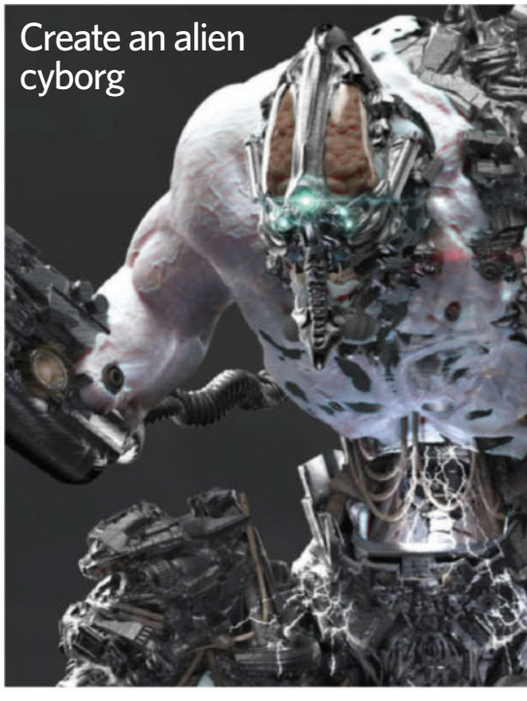

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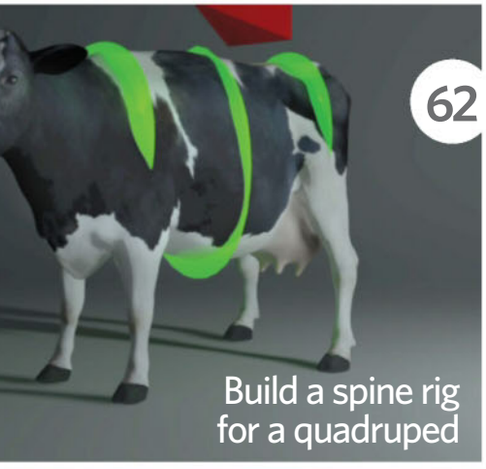

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> We're doing this for the first time and we have no idea what we're doing, but let's do it

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The Gallery

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Mike Hill

Mike uses 3D workflows to create believable technology for the entertainment industry

Personal portfolio
www.heavyunitdesign.com
Country Germany
Software 3ds Max

Work in progress...

"I worked iteratively to create the modules of the ship one by one, trying to emulate an engineering workflow. The mesh components are especially important as they are to become the backbone for designing other ships within the 'Fractured Space' series"

Mike Hill, *Fractured Space Flagship,* 2014

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Inho Kim

3DArtistonline

Username: icarus3d

Personal portfolio
www.icarus3d.com

Country South Korea

Software 3ds Max, ZBrush, V-Ray, HairFarm, Photoshop

Work in progress...

"I tried to create a beautiful woman dressed in classical clothes. I focused on creating the mood of the room with sunlight and the realistic material of each object"

Inho Kim, *Sitting Woman,* 2014

> I wanted to create a unique book cover, one that you wouldn't normally see in a bookstore. My main inspiration for this was the overall work from the Wachowskis. I like how they tell stories in a fresh way
>
> **Tony Andreas Rudolph,** *9am: Before the Fall,* 2014

Tony Andreas Rudolph

Tony is a 2D and 3D digital matte painter and concept artist in the feature film industry

Personal portfolio
www.zulusplitter.de

Country Canada

Software Maya, KeyShot, Photoshop

Work in progress...

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Cristiano Rinaldi

Based in Rome, Cristiano creates work in the fields of advertising, VFX and concept design

Personal portfolio
www.behance.net/simultan

Country Italy

Software ZBrush, MODO, KeyShot, Photoshop

Work in progress...

"The image represents a personal vision of the development of a new species: that in the future, machines will control nature"

Cristiano Rinaldi, *GALKENRES*, 2014

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“Working on this self-portrait, I made sure to have a lot of photo references. I wanted to find a balance between photorealism and that of a classical painting. I found the hardest part of the piece was to make it look like myself”

Ian Spriggs, *Self-Portrait,* 2014

Ian Spriggs

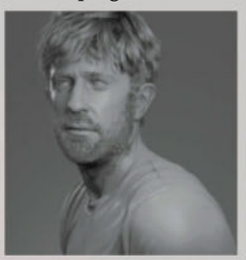
Ian is a visual artist working primarily in 3D. He specialises in character modelling for VFX

Personal portfolio
www.ianspriggs.com

Country Canada

Software Maya, Mudbox, Photoshop

Work in progress...



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As his model has been developed as a template, Jones reveals that as long as technology keeps progressing, he will treat his human project as one to keep tinkering with and improving ad infinitum

Masters of realism

These artists have recently shocked the CG world with their work on modelling, texturing, rigging and animating hyper-real human beings

Chris Jones www.chrisj.com.au
Software LightWave, Sculptris, Krita, Blender
Bio Chris has been interested in drawing, animation and special effects ever since he was a child. In 1994, he discovered 3D Studio 3 at university, where he was studying for his final year in industrial design. His final graduation project turned into his very first 3D project, and he has been working with it ever since.
We Recommend Watching Chris's animation, 'The Passenger' and then reading his making-of online at **www.thepassengerfilm.blogspot.com.au**. Injected with a great sense of humour throughout, (the opening title reads 'How to make a seven minute film in just eight years'), his story proves how complex the creative process can be and how amazing the results can be when you don't give up.

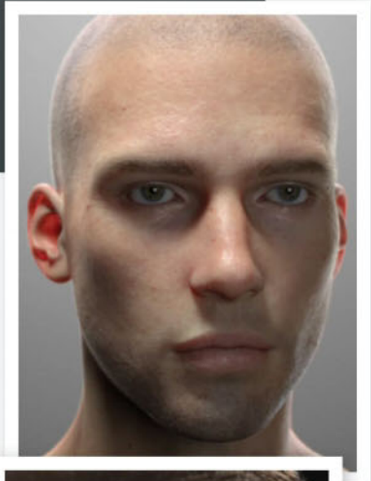
We loved your short, 'The Passenger', and were stunned by the work that went into it. Could you tell us more about it?
'The Passenger' was intended as a showreel piece when I started it in 1998, and it ended up as a seven-minute short film that absorbed a total of six years of my life over an eight-year period. I took it upon myself to design it, create the story, models, animation, sound effects and music – everything except for some mastering at a pro sound studio and transfer to 35mm film. I released it in 2006 and it went on to tour the festivals for several years thereafter.

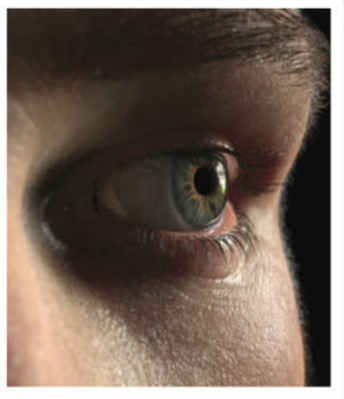
I had no intention of doing another short after I had finished; in fact I stopped doing 3D and re-evaluated my career for a while. It's only in the past few years that I've contemplated making something like another short, but I'd need to be sure it could be done in far less time than the last effort.

Could you tell us more about your new project featuring a hyper-real human? Stylistically it seems like a major shift from 'The Passenger'.
It harks back to my interest in realism and visual effects. I like cartoons to a degree, but I like live-action effects films better, and I felt that I had misrepresented myself with 'The Passenger' to some extent. It attracted a lot of attention from animation companies, but not so much from VFX ones.

The human project is partly an attempt to amend that, but its main purpose was to keep me productive while I deliberated over some new project ideas. It seemed safe to assume that they would need people in them, so I thought I'd make a generic template that could be modified into whatever humanoid character I needed. As long as I continue down this path, the goal would obviously be to make it indistinguishable from an actual human being.

Could you tell us more about the workflow so far?
I started by adding a body to a head model I made back when I was doing 'The Passenger' – if not earlier – and refined the





TOP Contrasting to Jones' previous project, 'The Passenger', this was an attempt to create a generic humanoid character that could be manipulated and tweaked for other future projects

BOTTOM In order to successfully animate the movement of eyeballs and the reaction of the eyelids and surrounding skin, Jones recommends studying live footage in slow motion

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> As long as I continue down this path, the goal would obviously be to make it indistinguishable from an actual human
>
> **Chris Jones**

topology. After that the process was quite convoluted with a lot of back and forth between programs since I was experimenting as I went.

I created UV maps and loaded the base mesh of the model into Sculptris, where I added finer detail, and then loaded the sculpt and the base mesh into Blender to bake the new detail into a Displacement map. Next, I loaded the base mesh back into Sculptris to paint Bump and Texture maps, and then applied the base mesh, Texture, Bump and Displacement maps in LightWave.

I rigged the body and began focusing on the hand, followed by the head. The face involved techniques such as dynamic wrinkles, which I achieved with the help of the DP Tension node, and I used some little scripts to link the face morphs to controls. I used chains of Effectors to simulate tendons, muscles and bone.

What have you found most useful in terms of techniques throughout this creation?

Along with LightWave and Sculptris, I've been using Krita for editing textures and painting the eyeball textures, and Blender for Displacement baking.

As for useful techniques, the Wrinkle maps have allowed me to keep the mesh very lightweight and manageable since I can paint or sculpt those details instead of having to model them in. Effectors are the most effective solution I've found for reproducing skin slide, although they're somewhat unwieldy when used in this way. I've also set up non-linear morphs for the eyelids, which allows the skin to unfold and warp organically as it travels over the eyeball.

If you could give any advice to others hoping to create as realistic a human as you have, what would you say?

Study lots of videos and photos – and yourself, even down to the microscopic level. Slow-motion video is particularly useful for things like eyes. Continually examine your model and surfacing from different angles and in a variety of different lighting conditions while you're working. Strive for physical accuracy and avoid shortcuts wherever possible, keep your textures sharp and high-res, and use the most physically accurate shaders, even if it dramatically extends render times.

Yasser El-Sherbiny Technical director
Galal Mohey Senior character artist
Website www.snapperstech.com

Software Maya, ZBrush

Bios Yasser El-Sherbiny is a computer engineer with more than ten years of experience in the animation industry developing SW and HW systems for 3D artists.
Galal Mohey is a 3D character artist with ten years of

TOP, BOTTOM "A good thing to do is to look at a lot of 3D scans to know how wrinkles look in a standard grey material," advises Galal on creating realistic humans

LEFT "Aside from the technical issues, I struggled to come up with a story and a title, and the project was plagued with creative blocks after the first couple of years," explains Jones

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experience in character design in films and triple-A games. He's currently senior character artist at Snappers.
We Recommend Take a look at a video of Yasser and Galal's incredible rig in action at the **www.snapperstech.com** YouTube channels.

Could you tell us more about yourselves?
Yasser We're small team of artists and developers from Egypt who are passionate about 3D computer animation, especially everything to do with 3D characters. Like many artists in the field, what got us into this is being inspired by the visual effects in movies such as *Terminator 2* and *Jurassic Park*, as well as games cinematics from companies such as Blizzard and Blur.

Being one the first companies to develop camera-based real-time markerless mo-cap was one of our biggest achievements.

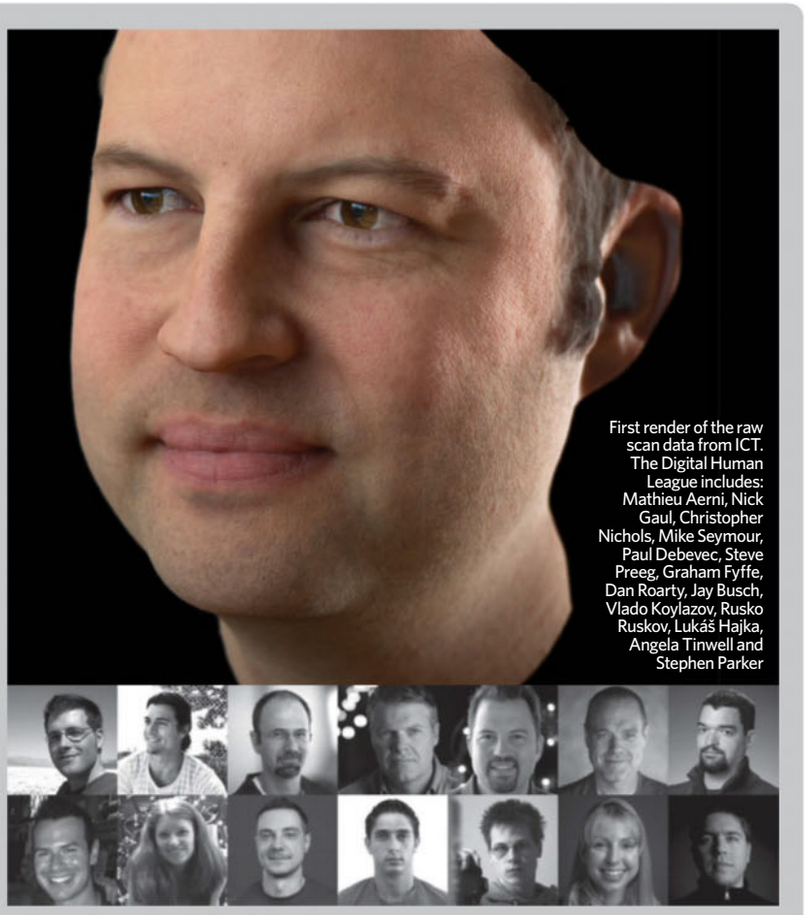
Take us through the workflow for modelling a realistic face.
Yasser The Wrinkle maps were done in ZBrush. After finishing all the Blend Shapes, we combined all the ones that contained wrinkles in a few new layers in ZBrush, such as a layer for the brows and smile details. We ended up with five or six layers that had all the wrinkles, then we add extra-fine details to these layers before we baked the Wrinkle maps. We tried to minimise the number of maps; with this rig we used three Wrinkle maps.

We then wrote a custom DirectX11 shader to allow us to see the wrinkles (Normal maps) in Maya's viewport as we moved the facial controllers. The Rig Manager is a tool we wrote to handle the rig, the selection of the facial controllers, setting and resetting the rig, saving/loading poses (Expressions) and so on.

How did you achieve such realistic deformations and motion using Blend Shapes?
Galal We believe that Blend Shapes are superior to Bones most of the time, as it gives the artist more control and flexibility to achieve a realistic expression, though you may have to add few corrective shapes and in-between Blend Shapes. What's most important is to make sure that most of the Blend Shapes work well together to have the motion right.

If you could give advice to other artists hoping to create realistic facial motion and rigs, what would you say?
Galal A mirror is your primary weapon, but you need to look at other people doing the motion in front of you with different lighting setups in front of you with different lighting setups. One thing that makes a Blend Shape look realistic is skin sliding. You have no idea how much skin sliding is happening. For example, with the jaw-drop Blend Shape, all the skin except for the mouth area is almost still in its place and not going down with the jaw – all you see is bones and muscles moving beneath the skin.

> "A mirror is your primary weapon, but you need to look at other people doing the motion in front of you with different lighting setups"
> **Galal Mohey**



First render of the raw scan data from ICT. The Digital Human League includes: Mathieu Aerni, Nick Gaul, Christopher Nichols, Mike Seymour, Paul Debevec, Steve Preeg, Graham Fyffe, Dan Roarty, Jay Busch, Vlado Koylazov, Rusko Ruskov, Lukáš Hajka, Angela Tinwell and Stephen Parker

The Wiki Human Project

A group of the industry's best artists are looking into the science behind the uncanny valley – and publishing their digital-human results to download for free

An incredible new project studying the science behind what makes a human look real is coming from some of the best VFX artists in the industry, who have playfully dubbed themselves the Digital Human League. The group first began with Christopher Nichols, creative director at Chaos Group, and includes Academy Award-winning Steve Preeg, Blur Studio's lead artist Mathieu Aerni, Weta Digital's senior modeller Nick Gaul, and Dan Roarty, whose work graced the front cover of **3D Artist** issue 37.

After creating human characters and doubles at Digital Domain, Nichols initially started talking to chief visual officers at USC's Institute for Creative Technologies about the ways they could progress this research further. "ICT has incredible ways of capturing human forms and faces and getting a lot of detail from those scans," he explains. "It has all this information that it gives to the studio, like very high-res models, including several detailed Texture maps, but there's no real guide on how to use that texture information. It got me thinking, how great would it be if we had something like a guide on how to use your Texture maps, for example. That became the basis for us to analyse what is needed for re-creating a digital human, to try to remove all of the variables and approach the process in a more scientific way."

The Digital Human League was born, and the team is now exploring every aspect of what makes us distinguish a real human from a fake one, focusing on details such as how to animate a person who's just standing still, and how we can notice even tiny differences in a person's complexion that blood circulation will make. Best of all, the group intends to make its work open-source, so anyone can download the files to take a look.

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Introducing Blackmagic URSA, the world's first user upgradeable 4K digital film camera!

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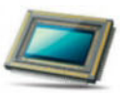

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Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

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to view the art and chat to the artists

A Survey of Daraxos 17-b
» **Eric Lloyd Brown**
3DA username Digitalproselyte
Eric says: "For this piece I imagined explorers visiting a habitable planet for purposes of colonisation. Although Earth-like, I wanted to add a level of otherworldly wonder to it as well."
We say: *This image from Eric really impressed us, as it conjures such a tangible sense of atmosphere and mood. It's bleak and mysterious, with the clouds that eclipse the Sun a particular highlight. There's a real sense of being lost in another world.*

B Elephant
» **Andres Zorrilla**
3DA username AndresZorrilla
Andres says: "For this project I've gathered a lot of references for the model: skeleton, muscles, fat, skin and wrinkles. A majority of the wrinkles (head, trunk, tail, elbows and knees) were made by hand."
We say: *This is a wonderful example of photorealism, and an intricate study in how to create realistic wrinkles. It's not an easy thing to do, but Andres has succeeded brilliantly in re-creating nature, great stuff. We look forward to seeing more of his work!*

C Mech Sentry Drone
» **Paul Massey**
3DA username EclipseCGI
Tom says: "Inspired by Vitaly Bulgarov, I wanted to experiment with the actual concept and final presentation, so I utilised kit-bashed parts to make the design process much more fluid. This mech was created with Cinema 4D and Octane."
We say: *Paul's mech demonstrates incredible attention to detail and looks extremely imposing. It was really popular with the team and with all of you who follow us on Facebook and Twitter, and deservedly so!*

D Deep Sea Creature
» **Martin Bässler**
3DA username martinius
Martin says: "All modelling was done in Blender, except for the red, gill-like element, which was generated with Structure Synth and remeshed with MeshLab. The render is done with Cycles, with some post-work done in Photoshop CS1."
We say: *This leapt out at us immediately when we saw it on the site. It's such a strange, abstract project, but the wild use of colours and different textures really works. Martin has a vivid imagination, and imagination breeds excellent art.*

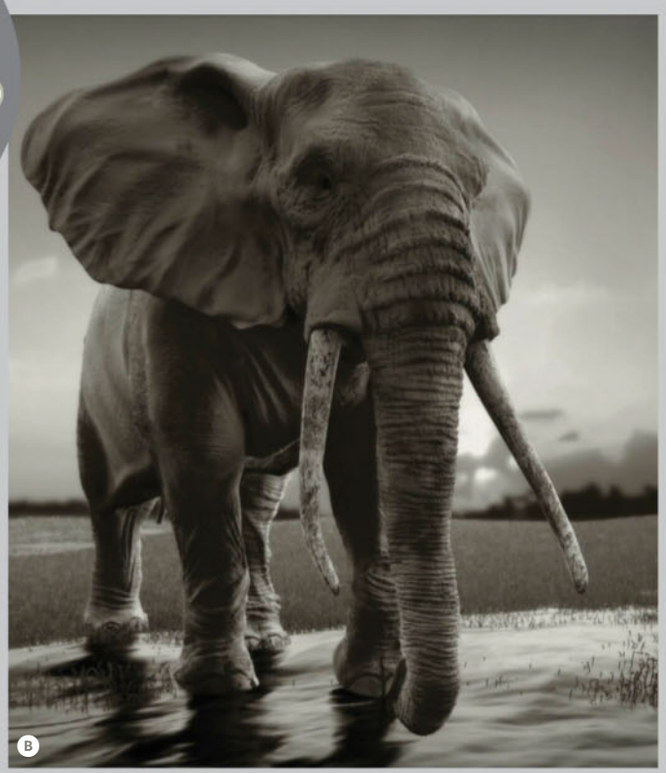

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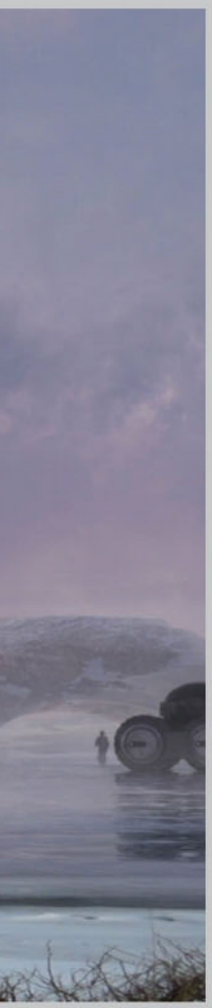
Image of the month



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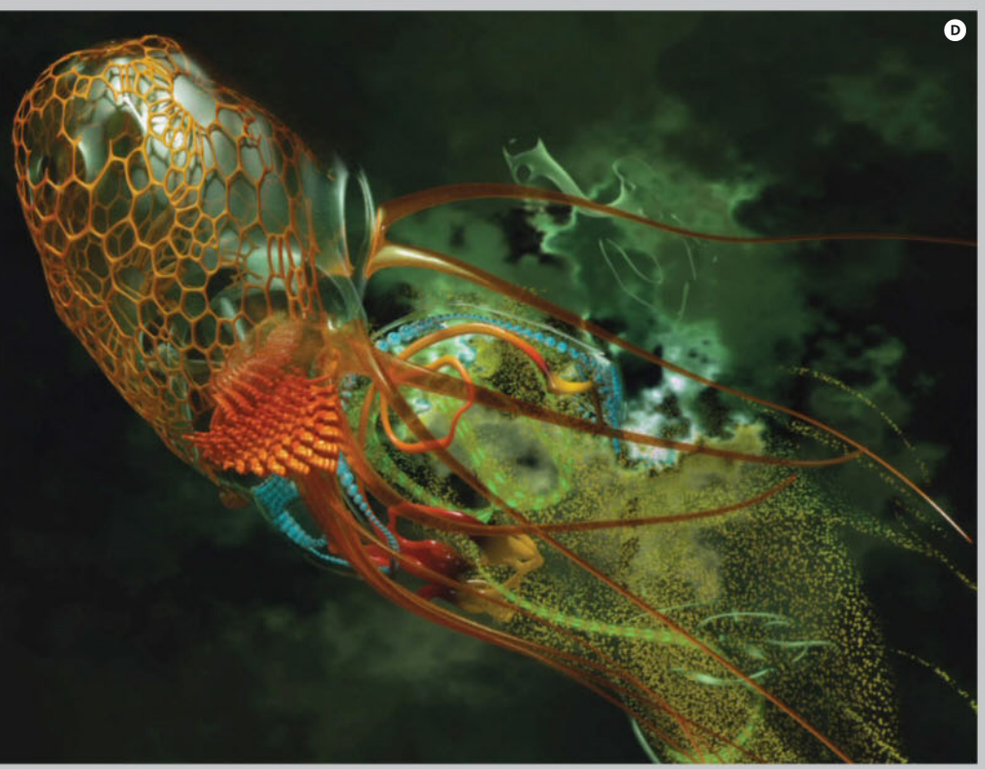

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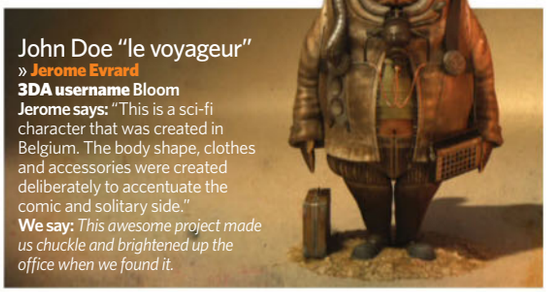

John Doe "le voyageur"

» **Jerome Evrard**
3DA username Bloom
Jerome says: "This is a sci-fi character that was created in Belgium. The body shape, clothes and accessories were created deliberately to accentuate the comic and solitary side."
We say: *This awesome project made us chuckle and brightened up the office when we found it.*

Furniture Test Scene

» **Andrew Ryan Parker**
3DA username Andrew_Ryan
Andrew says: "Created in my spare time at work, it was initially just to test different pieces of furniture in. I was really happy with the results and decided to share it online. It has very basic post, using just a few elements, as I wanted to try to create as much natural contrast and light in 3D. Wall art by Charles Williams – **www.madeup.org**"
We say: *We love the crisp, clean nature of this piece. A lot of attention has been paid to the brickwork in the background of the piece, giving it a New York-loft feel.*

Water Globe

» **Mitch Forsburg**
3DA username MForsburg
Mitch says: "This 3D water globe was done in Blender, rendered with Cycles. It took roughly a day to model and set up the lighting. I was inspired to make this because of Blender's wonderful fluid sim."
We say: *Mitch has worked hard to create this image, and we love it. Mitch is, in fact, only 14 years old, and work like this demonstrates that he has a very promising future ahead of him in 3D.*

My Casio

» **Mohamad Reza Faal**
3DA username keyvanfd
Mohamad says: "I made the scene by looking at my own watch, which is very valuable for me. I used Maya and Composite, trying to focus on the details and to use anything that makes my work closer to reality."
We say: *Some people take pride in modelling something special to them, and that's exactly what Mohamad has done here with his Casio. Great job!*

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> “You saw that pioneering spirit here of ‘we’re doing this for the first time and we have no idea what we’re doing, but let’s do it’”
>
> **SIMON J SMITH**

Contributors

Simon J Smith
Director

Philippe Gluckman
VFX supervisor

Jonathan Harman
Head of lighting

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THE MAKING OF PENGUINS OF MADAGASCAR

We talk to the writer, director, VFX supervisor and head of lighting about how they transformed the classic penguin team from sidekicks into stars

This year was a very memorable one for DreamWorks. Amidst several feature film releases, shocking rumours that the studio was in sales talks with Japan-based SoftBank Corp and the unveiling of the team's groundbreaking new in-house animation software, Premo, came a special date: DreamWorks's 20th anniversary.

Looking back on these past 20 years, one of the studio's most successful ventures – along with *Shrek* and *How To Train Your Dragon* – has been *Madagascar*, a series that has earned the company close to 2 billion dollars since its debut in 2005. The rewards show no sign of dwindling either. *Madagascar 4* is scheduled for 2018, and the much-loved penguin characters in the original film – Skipper, Kowalski, Rico and Private – have since gotten their own Nickelodeon series along with a licensed toy line and videogame for Nintendo DS. Now, they're getting their own feature film too: *Penguins Of Madagascar*.

Of course, the new spin-off neatly completes DreamWorks's pledge to release three feature films each year until 2016 after the screenings of *Mr Peabody And Sherman* and *How To Train Your Dragon 2*. It also, however, allows audiences everywhere to see the moment when our favourite elite penguin team first met, and watch as the four heroes face an eccentric genius from their past known as Dr Octavius or, more forgettably, Dave.

Along with a cast featuring the likes of Benedict Cumberbatch and John Malkovich, the team needed to build multiple locations, introduce a host of new characters including an owl, seal, bear and octopus, and deal with a schedule that was unexpectedly cut six months short when the studio switched the release dates for its next two films, pushing *Home* back and *Penguins Of Madagascar* forward. All this, while working across continents – sharing scenes from the DreamWorks PDI and Glendale facilities in the US to Bangalore in India.

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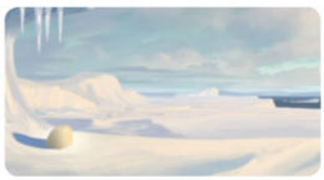
Penguins Of Madagascar

The team was using next-gen animation tool, Premo. "It wasn't difficult to translate the characters to make them work with Premo, we just had to be careful not to break them," says director Simon J Smith

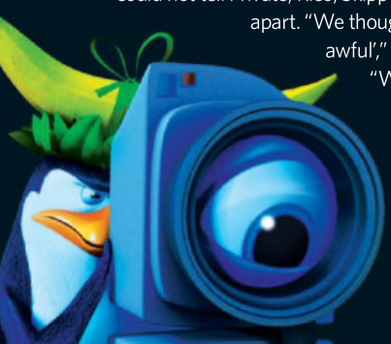


A NEW SPOTLIGHT

Funnily enough, the first script for *Penguins Of Madagascar* was written almost ten years ago – after the original *Madagascar* film. "I think it was meant to be a TV movie back then, but then they decided to hold off on it because *Madagascar* was such a huge hit," begins director of *Penguins Of Madagascar*, Simon J Smith. It was around Thanksgiving four years ago that he first got the call from DreamWorks asking if he would be interested in directing not a TV movie, but a full feature film about the penguins instead. "They're my favourite characters in *Madagascar*, so that was it," he explains. "It took off."

The penguins were initially invented solely for the purpose of comic relief in *Madagascar*, though. Going from secondary characters to a spotlight where audiences had to truly care about them was another matter, and not just for the storyline.

The models also had to be completely remade. Not only were they simply not complex enough to carry all the emotions needed for a feature film, but after a test featuring still frames of every character doing a variety of facial expressions, even Jeffrey Katzenberg and the other heads of the company could not tell Private, Rico, Skipper, and Kowalski apart. "We thought 'well, this is awful'," Smith continues. "We had to look at their silhouettes and hone them in a bit more. Private had a super-rounded-off head, for instance. We have no clothes to distinguish them and we have a whole bunch of other penguins, so you really needed them to stand out so you could really see who was who."



The team also needed to make sure that it always kept to its budget – which was lower than other DreamWorks films – while never compromising on quality. Assets, such as trees, set dressing and even some crowds from other movies, were reused from the studio's digital backlog – as long as they didn't conflict with the design of the film.

Even more ingenious shortcuts were employed for the octopus antagonists, who almost didn't make it into the film at all. "It's interesting to learn that initially the studio was actually a bit scared that we would embark on this film with an octopus," reveals VFX supervisor, Philippe Gluckman. "They thought that animating an eight-legged animal was going to be too hard and take too much time for the animators. Luckily the director felt quite strongly that it was a good idea, and we did compromise – we only gave them six legs!"

"We also worked out a way of doing it where technically what you've got is tails reused from *How To Train Your Dragon* as the tentacles, with a head on top," Smith continues. "That's how the octopuses were made, and it proved that we weren't going to kill animation."

THE PIPELINE

Throughout the four years of work on the film, the DreamWorks artists switched from using Naiad in Maya to using Houdini and Mantra to create and render water for the film, which plays a huge role in sequences such as a chase scene in Venice. It also marked the last time they used proprietary software Light, developing it to the best it would be before being replaced by next-gen lighting package, Torch.

The studio's new attention to diagnostics was a crucial part of the lighting process throughout the film, where every asset would be meticulously checked in an environment called vdev. In vdev, every element and character that had gone through surfacing would be spun around in a control scene to focus on how specific material properties, such as the Reflection map, Diffuse property or Displacement would really look. "The idea behind the vdev environment rig is that it's very simple," explains Jonathan Harman, head of lighting on *Penguins Of Madagascar*. "So it has very basic back lighting and a key light and various versions of an environment HDR map for a day time, a night-time, and an evening. In lighting, we then basically go off of that, so our first default lighting rig is based on the vdev rig and then you start altering from there."

"Another interesting thing we did on the show is use a lot of deep compositing, meaning that we would render deep files," he adds. "When we have lots of assets, we want to parallelise the rendering of those assets so we break them down into lots of smaller pieces. So, if you have groups of 2,000 characters you might want to render them down into groups of 200, and that will significantly reduce your length of the renderer."

"The problem comes when you want to assemble those back together. For example, what we have in the end of the movie is humans running around, and also zombie-mutant penguins running

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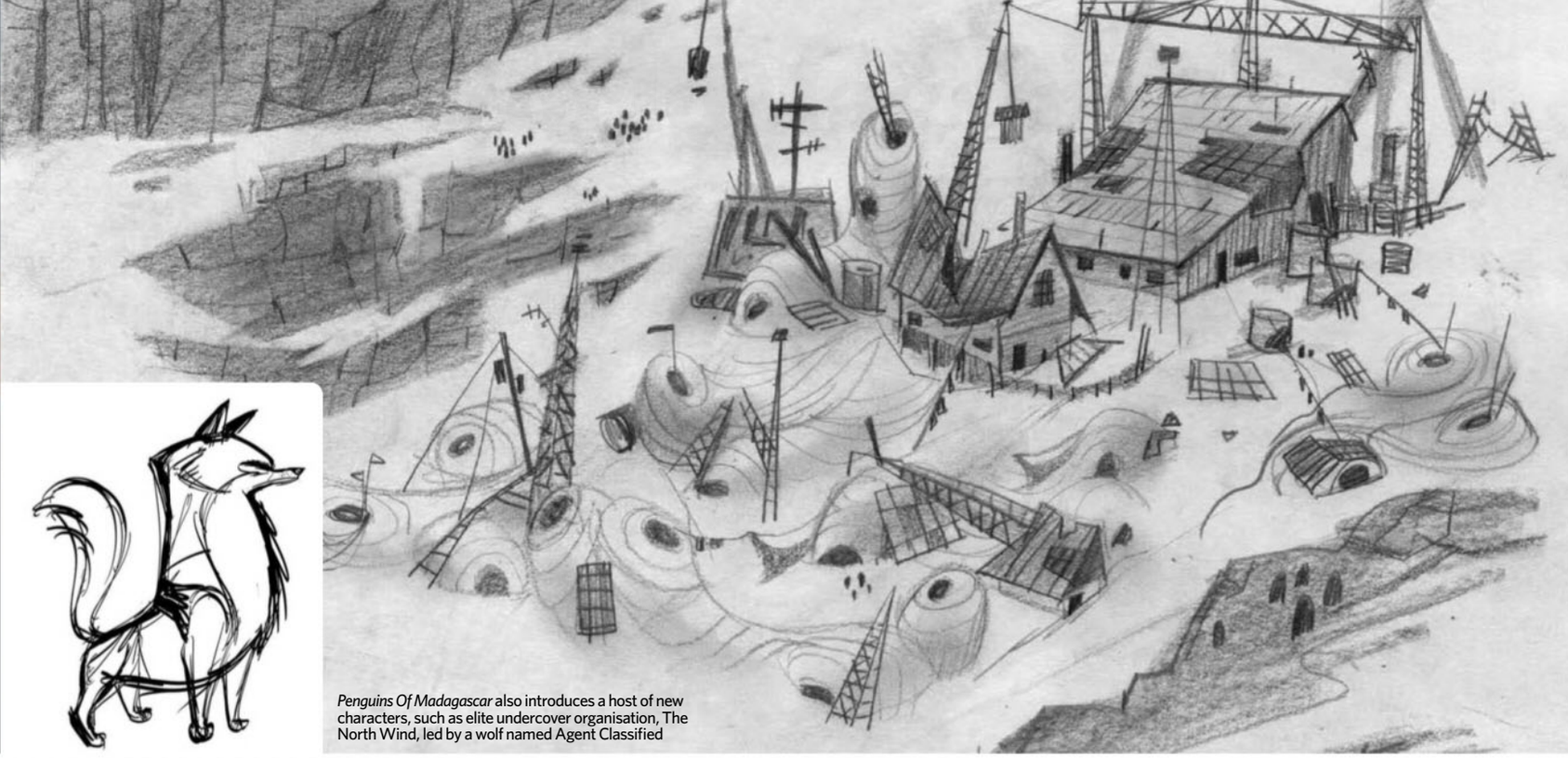

Penguins Of Madagascar also introduces a host of new characters, such as elite undercover organisation, The North Wind, led by a wolf named Agent Classified

throughout this group of characters, and there's complete chaos," Harman continues. "In the composites you can spend a bunch of time in NUKE figuring out what character is running in front of what character. The deep-file image allows for every pixel on that character to know its place on every frame, so it knows where it is in space. We just used the deep files to cut them out automatically, so you never had to figure out in what order they sat."

"DreamWorks is historically very reluctant to do too much in compositing. I personally believe that there's a balance and I think we found the right balance here," tells Gluckman. "We also used compositing almost like a prototype tool. Basically, we would use NUKE to look at lighting and stuff like that, for example, say 'what about this or this other thing', [and] actually do it interactively with the compositor. We would actually start calling them Nukeovers! When that was okay, then the lighters could do it for real, so to speak."

Throughout the show, the team also worked with the studio to continue developing a new LOD – or level of detail – system. With it, assets far away from the camera would be automatically simplified in every shot, appearing as a lower-res model with a less complex shading and surfacing network compared to any assets close-up. Rendering would become much faster and more efficient.

"We worked together automating systems to decimate models, and a person would look at that model and say 'yes, the automated system did a good job'. Nearly every asset went through that check and automated reduction," explains Harman. "The way it worked was each particular asset has versions of itself, so we model a car as one version and then we make two other versions – a medium and a light – and those two versions are always sitting out there waiting for the particular scene to call the version that's needed, which is kind of cool."

DREAMWORKS' MOST RECENT TITLES

How To Train Your Dragon 2

Lifetime gross (at the time of writing): $176,605,915

Aspiring to one of director Dean DeBlois's favourite films, *The Empire Strikes Back*, *How To Train Your Dragon 2* is set five years after the first instalment and introduces a host of new locations and dragon species as Hiccup faces up to adulthood and becoming chief.

Mr Peabody and Sherman

Lifetime gross: $111,506,430

A computer-animated adaptation of Jay Ward's pioneering work, the film stars Mr Peabody, an advanced dog-genius, and his adopted human 'pet' son Sherman as they travel through history using Peabody's 'WABAC' or 'Wayback' machine in order to fix a time rift that they accidentally created.

Turbo

Lifetime gross: $83,028,128

Based on an original concept by first-time director David Soren, *Turbo* tells the story of a garden snail, Theo, who dreams of winning the infamous American Indy 500 race. It makes him an outcast within the slow and cautious snail community – until a freak accident turns him into Turbo, the fastest snail in the world.

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Penguins Of Madagascar

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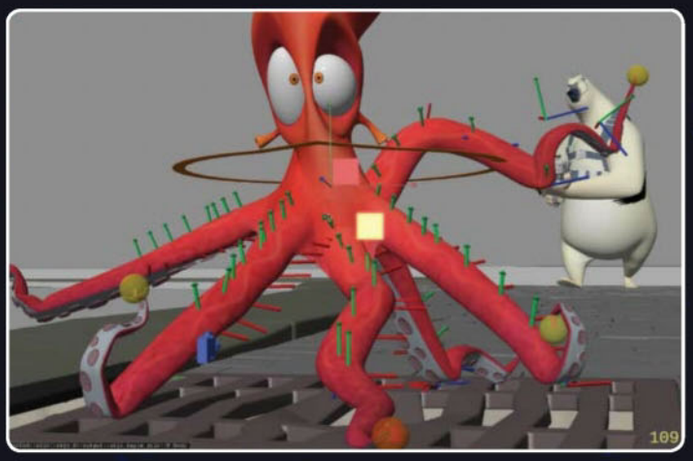

> “It’s interesting to learn that initially the studio was actually a bit scared that we would embark on this film with an octopus”
>
> **PHILIPPE GLUCKMAN**

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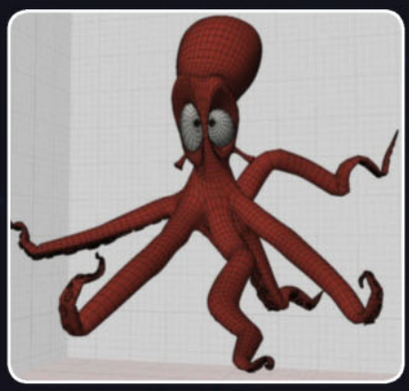

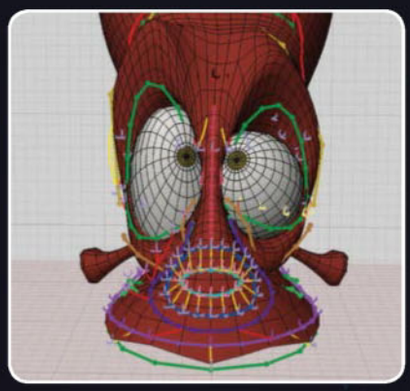

The octopus characters were almost not going to be in the film due to concerns at how difficult they would be to animate. Tricks such as recycling the *How To Train Your Dragon 2* dragon tails as tentacles allowed the characters to be possible

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Eric Darnel
Writer

••3 QUESTIONS ••

After so much success with both writing and directing *Madagascar*, and *Madagascar* 4 coming to cinemas in 2018, what is it that made you first become interested in starting to work on a spin-off feature? Where did the idea of including penguins in a film come from?

The thing that will always hold a special place in my heart is when the *Madagascar* series was just getting started, Tom McGrath – my partner – had just come off of a penguin film that got canned for some reason, and I had just come off of a penguin film that got canned for another reason – they were not related to *Madagascar* at all. So Tom came in and was determined to get penguins into the movie that we were making, even though they weren't in the script or part of the story or anything. He just came up with this funny action where they end up knocking the lead characters off that ship, and they became this great little secondary comedic platform that we turned to again and again for set pieces. Of course, the characters themselves are so much fun and almost classic.

When it comes to *Penguins Of Madagascar*, what were the team's main aims? What challenges did the team face?

[The penguins] made it this far based on pure comic power, and the big challenge for us with this film was making sure that we kept all of that comedy and all that fun and all those things that people love about the penguins in the movie. We [had to] find a way to dig a little deeper and find out more, developing the characters to a degree that would warrant their own film. It was a big challenge, but it was a fun part of it too.

How stressful was it to find out that your deadline for the film had been brought forward by six months? How did you manage it?

You're all settled into this way of working and this rhythm, and then suddenly you have to bring the movie out earlier. So everybody just needed to buckle down and do 14-hour workdays sometimes and even stay overnight because we had to collaborate with our counterparts who would come in really early in the morning. There were a lot of animators who weren't having dinner with their families because we were just so busy trying to get the movie made. At the end of the day though, I think that push really energised the project and really got us to charge through our story and make those final decisions that needed to be made about our climax. It's just been finished in its final form, which was so exciting after so many years to have it truly in the can.

Penguins Of Madagascar

FINAL DEADLINES

"Everybody on this film did such an amazing job because we had such a tight schedule," concludes Smith. "We lost six months at the end and it was a miracle that they pulled it off, because we could not believe that we had a year to go, and then suddenly we had just months to go."

For the artists at Bangalore doing most of the film, it's been an extraordinary success, and even a new turning point. "They did an unbelievable job," Simon continues. "It just took them to a new level of animation and raised the bar globally in the studio. Everybody at Glendale was going 'oh my God, these guys are just kicking ass'!"

"For me that's the big story," agrees Gluckman, who was a part of the Bangalore team. He explains that before this show, India's studio had worked on several features, but not in the finishing stages, and had never been the ones establishing most of the animation before. "You know, I've been at PDI and DreamWorks for so long – I was on *Antz*, and to me it was a kick back to that," he reveals. "You saw that pioneering spirit here of 'we're doing this for the first time and we have no idea what we're doing, but let's do it'. It was amazing."

"Everybody sacrificed a lot of family time so the film wasn't compromised at all; it was so good because everybody did such a brilliant job," Smith points out. When he first started as director, his now five-year-old daughter was only one, and he couldn't wait to finish the movie so that he could take her to see it. "I made this film for my daughter," he explains, revealing that for him too, it's been a huge sacrifice. "It's been a tough year because she didn't see me for a long time. Most of the time I would only get home at 11pm."

For the final approval of the last *Penguins Of Madagascar* reel, however, Smith took his daughter into the studio, and finally they got to see it together. "She loved it," he reveals, "and it was a lovely way to end the movie, showing her. It was fantastic."

PENGUINS BY THE NUMBERS

2 The number of people, including writer Eric Darnel, that first invented the penguins as comic relief for *Madagascar*

4 years is the length of time the crew was working on *Penguins Of Madagascar*

UP TO 500 People worked on the project between DreamWorks PDI at Glendale and even in Bangalore

6 The number of months lost at the end of the schedule when *Penguins Of Madagascar* was pulled forward and *Home* pushed back for release in 2015

30 Animation films by DreamWorks, with *Penguins Of Madagascar* being the most recent

144 The number of episodes of *The Penguins Of Madagascar* series on Nickelodeon

2/3 Of the movie was completed in India, including the majority of the animation, lighting, and surfacing work. "Basically for the third act, the schedule was shortened, so in order to accommodate that schedule change, we added US teams to help finish the film," says Harman

8 The number of tentacles an octopus has. To avoid overwhelming animators, the team reduced this to just six for *Penguins Of Madagascar*

> "The deep-file image allows for every pixel on that character to know its place on every frame, so it knows where it is in space"
>
> **JONATHAN HARMAN**

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Step by step

Easy-to-follow guides take you from concept to the final render

David Molina Zabaleta aka Caleb Nefzen

Personal portfolio site www.artstation.com/artist/CalebNefzen

Location Colombia

Software used ZBrush, Maya, UVLayout, KeyShot, Photoshop

Expertise Character modelling, sculpting, texturing and rendering

Create an alien cyborg

Chaotic cyborg 2014

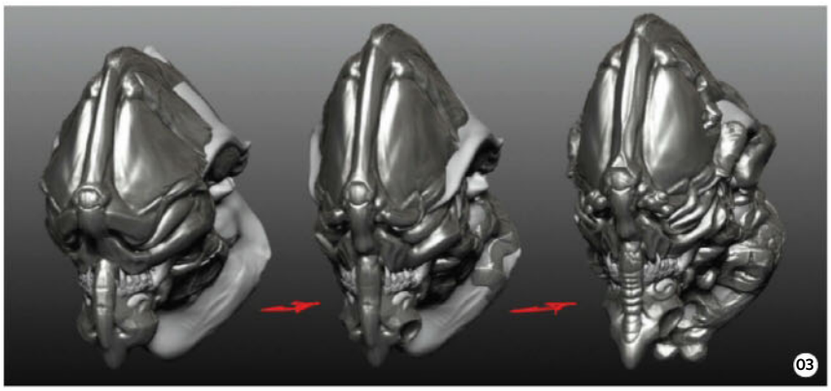
"Combining hard-surface modelling with organic sculpting, create a realistic sci-fi creature from concept to final 3D still"

David Molina Zabaleta is a CG artist working in character creation, from conception to sculpting, texturing and rendering

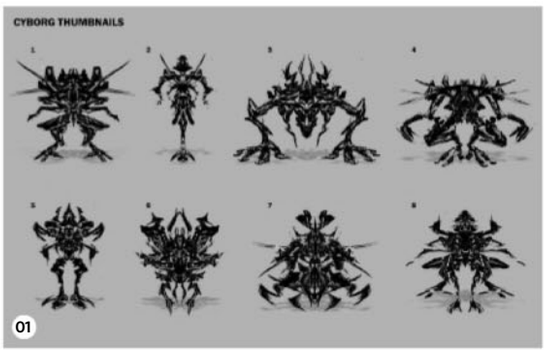
When it comes to sculpting sci-fi creations, it's important to understand the compatibility of both organic and hard-surface modelling. In this tutorial we'll take a look at creating an alien cyborg, combining both these types of modelling. We'll start by considering the concept of our character and how to come up with a character that's both totally unique, yet completely realistic and believable. Once we have an idea that we're happy with, we'll work on utilising both organic and hard-surface techniques to create our creature. This tutorial should serve as a great way to develop your ZBrush skills, whether you're new to it, or just looking to experiment.

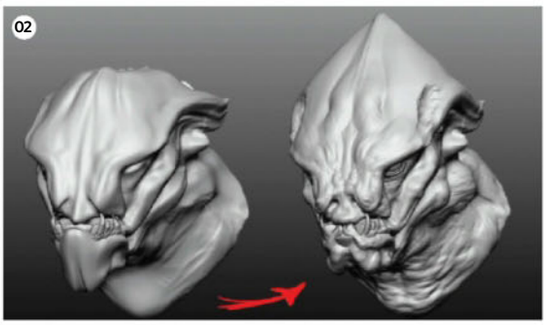
01 Work with silhouette concepts The first thing that you need to think about is what era your character is from. Is it the past, the present or a distant future? If you have a clear idea about the kind of environment that your character inhabits, you can decide on the tone of your work – whether it's dark and gritty, or bright and otherworldly. Once you've answered these questions, you can play with shapes and silhouettes using the QuickSketch feature in ZBrush. You could also use Alchemy to draw out your ideas. Using tools like Symmetry, you can produce a wide range a variable ideas, working with lines or shades set to different values.

02 Create the head In my work, I already knew that I wanted some kind of alien cyborg. By playing with shapes, I became more certain of my idea and decided to go straight ahead with the sculpting process. Starting work on the head, it's possible to build up a more tangible impression of the alien. Make use of the Clay, Move and Clay Buildup sculpting brushes with large, confident strokes on the mesh. By playing with DynaMesh at a reasonable resolution, we can work on the appearance of the alien, even if we're going to cover up its head later on.



03 Begin with the helmet Now that we have a decent head, we can start to think more about the character. In this case, I was thinking that it would be a big, bulky beast; a fallen warrior that's been brought back to life with its own technology, or even someone else's tech. In order to create the look and feel of this theme, we need to make a fairly chaotic rudimentary assemblage. Start off by duplicating the head, then go to Tools>Deformation sub-palette and set Inflate to -1. Use another material that resembles metal so that you can start sculpting the helmet. Use your imagination to bring your character to life!





Set your mind free

Always let yourself work freely, using the Clay and Clay BuildUp brushes to create basic shapes. Be aware of every stroke that you place, and play with these, combining strong strokes with the Lazy Mouse function for straighter lines. When you feel ready, use the Pinch and Dam_Standard brushes. When you do this, make sure that your mind is clear. You'll be surprised at the creativity that comes through when you're not really thinking about what you're doing. Just make sure you work from big to small.

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LEARN MORE ABOUT ROBOT DESIGN FROM OUR COVER ARTIST ON PAGE 40

Learn how to

- Define hard-surface sculpting
- Retopologise
- Create custom IMMs
- Texture
- Break down the sculpt
- Kitbash
- Take advantage of DynaMesh
- Create silhouette concepts

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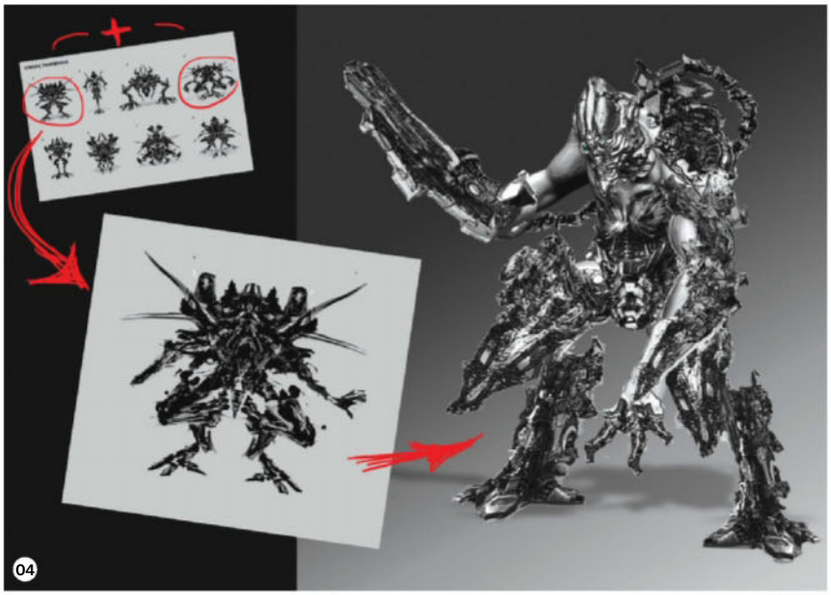
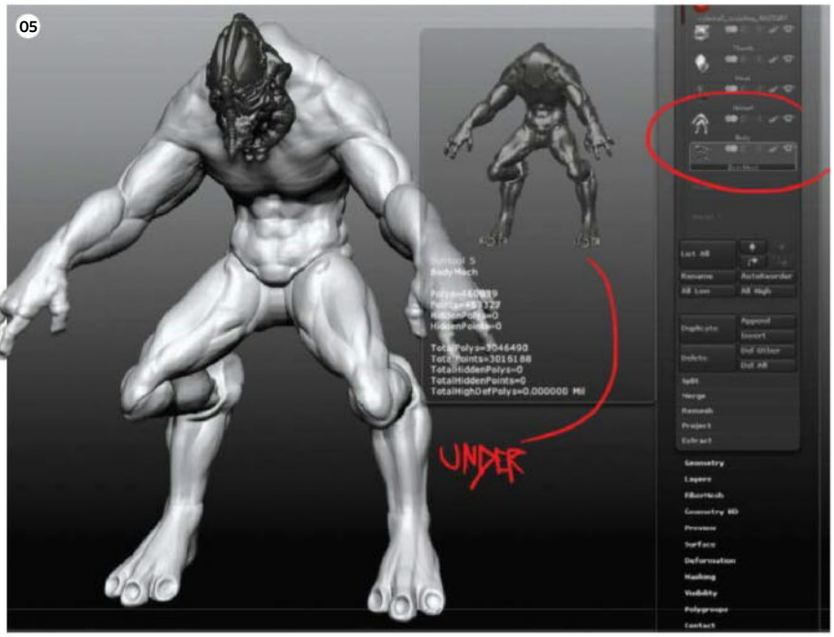
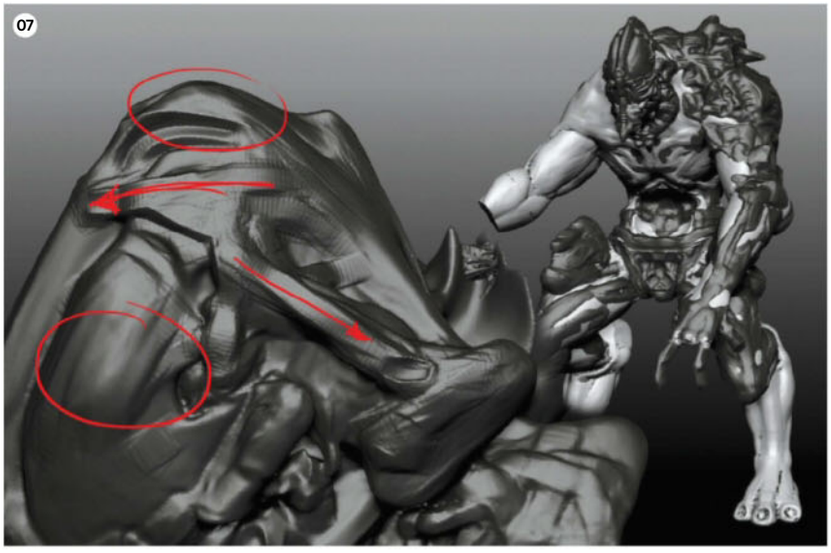


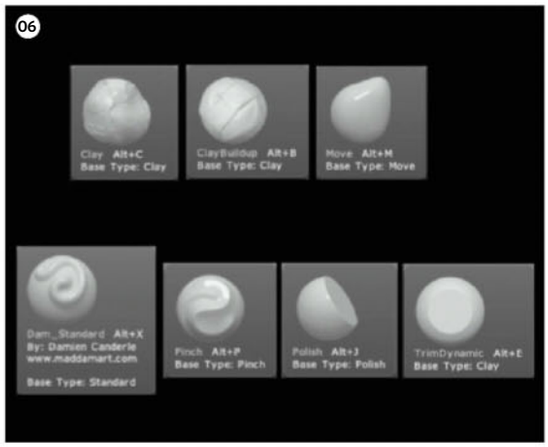




04 Decide the final concept Once we've got the shape and feel of the helmet, we'll need to begin work on the body. Going back to the shapes and silhouettes, pick one of the designs that fits in best with the head. If you need to, mix some of your ideas together to create a new body. Then, using DynaMesh, work on the basic forms of the body, guiding yourself with the concept drawing. It's worth noting that the concepts that you create are only there to guide you through the creative process. Once you're done, do a quick render and jump into Photoshop to finalise your concept.

05 Prepare the mesh with DynaMesh Now that we have our final concept and we're happy with it, go back to your workspace in ZBrush and prepare the model. Once again, take the body and name it however you like (I named mine 'bodyDynamesh'), duplicate it and go back to the Deformations sub-palette and set Inflate to -1 again. Name this 'bodyMech' – it should give you total control over what you'll be working on. Ensure that you keep your naming convention clean and tidy, as this will improve your workflow. Apply a metal material onto the body mech mesh so when it comes to working visually, you won't have any confusing issues.

06 Basic overview of the tools Using the right brushes will always lead to better results, and knowing which one you need to use in certain situations will massively improve your workflow. The Clay, Clay BuildUp, Inflate, Standard and Move brushes will really help you when it comes to sculpting organic things. On the flip side of this, the Trim Dynamic, Adaptive, Polish, Hpolish, Pinch and Dam_ Standard brushes will be absolutely perfect for hard-surface objects. It's worth using hotkeys as well, as these are great time-saving tools. Check the different brush features and experiment with them. Lazy Mouse, SmoothDirectional and AccuCurve are all very important and hugely underrated features to use.



07 Kitbash It's now time to play with DynaMesh. Using the Clay BuildUp brush, make quick marks over it, as it's a very versatile brush for both organic and hard-surface modelling. While you're working, you may find it useful to press Alt sometimes, as this will enable you to add or subtract in a couple of strokes, providing you with a wealth of new sculpting opportunities. Don't spend too much time on this stage – after all, the only thing that you'll be doing is blocking out the forms. If you see forms that you're unhappy with but that you don't want to lose, use the Dam_Standard brush with the help of Lazy Mouse to tame them.

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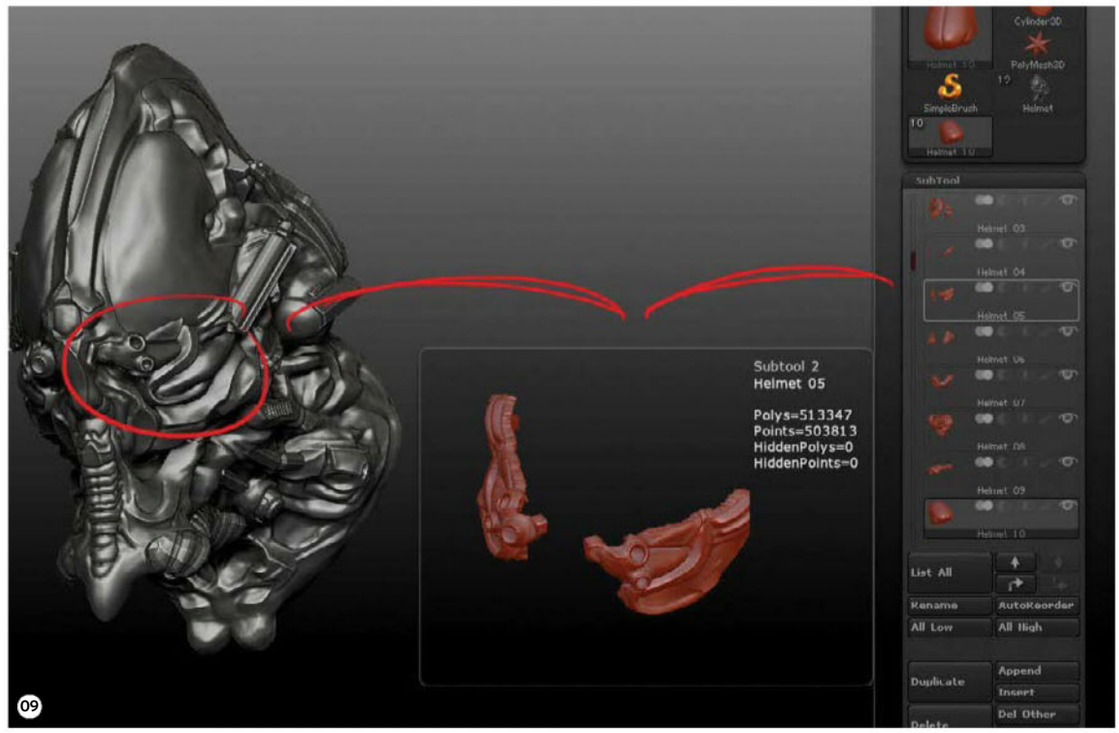
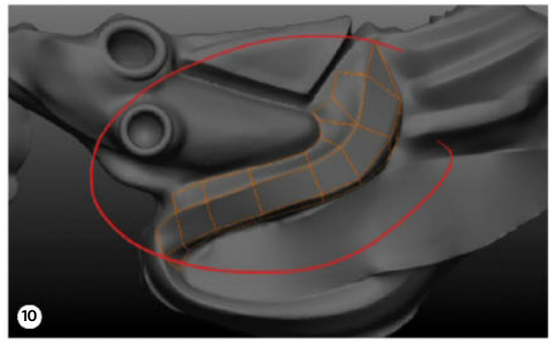
08 Define the forms When you feel that you've got something interesting and a character that you can really develop, it's time to start shaping and sharpening your model. It's probably easier to keep using the Dam_Standard brush along with Lazy Mouse for this stage. After the initial blocking out, fee free to use the Polish and Trim brushes. It might be useful to use the FocalShift and Z Intensity tools, as this will open up more possibilities in your sculpt by adding variation and depth to your work.

Don't rely on Auto

It's always nice to have the tools do all the hard work for you, but I strongly advise against this, as there's nothing better than you having total control over your work. Automatic tools, such as ZRemesher, are very helpful when it comes to the workflow, but remember to check and modify the results. Even though it's a more time-consuming and labour-intensive process to do it all by yourself, the end result will be so much better and rewarding.

09 Split it into several parts In order to reach a higher level of detail in your sculpt, make use of PolyGroups and split the sculpt up into different parts. These PolyGroups should include the torso, shoulders, forearms, arms, hands and legs among others. Once all of these are set to separate SubTools, you'll have to do the same for each section again, so the shoulder will have to be split into three different parts, as will the arms, the legs and so on. By doing this, you'll provide DynaMesh with more resolution on your shapes without losing any details, which will result in a higher-quality sculpt.





10 Retopologise and remesh Once the parts are more defined, you can use the ZRemesher feature to generate the basic geometry. This can be modified, adding edge loops and subdivisions to give the model more sharpness. If the form requires more intricate details, use the ZSpheres Retopology tool. Select the SubTool that you want to retopologise, then in the Tool palette, click over it and select the ZSphere, then your SubTool will be replaced with a ZSphere. Go back to the Tool palette again, go to the Rigging sub-palette, press Select Mesh and pick the desired SubTool so that you can manually begin retopology. Sometimes it's better to work manually rather than relying on automatic functions.

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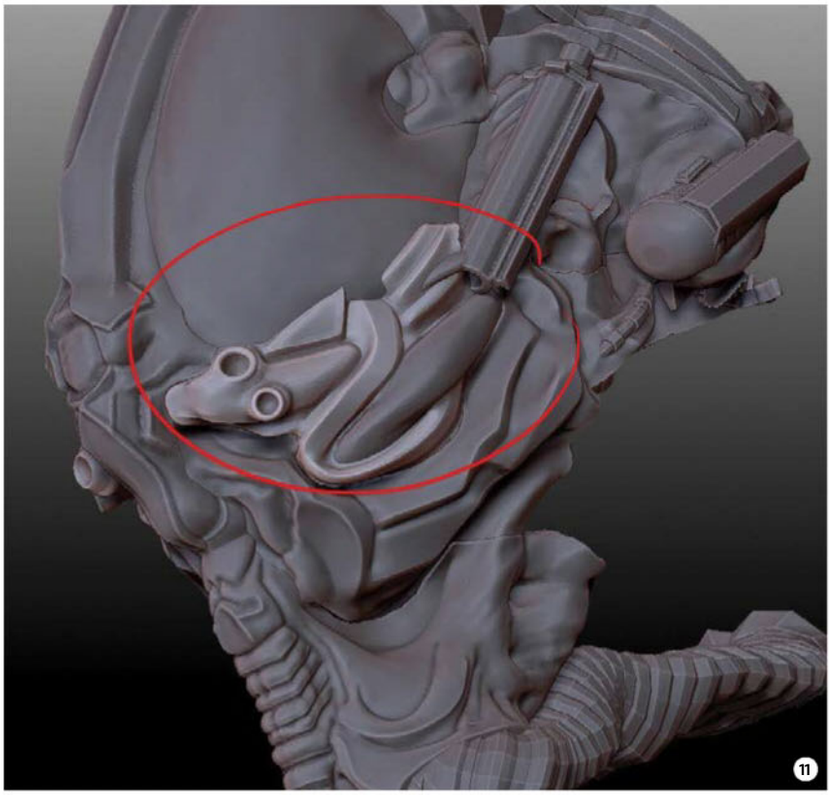
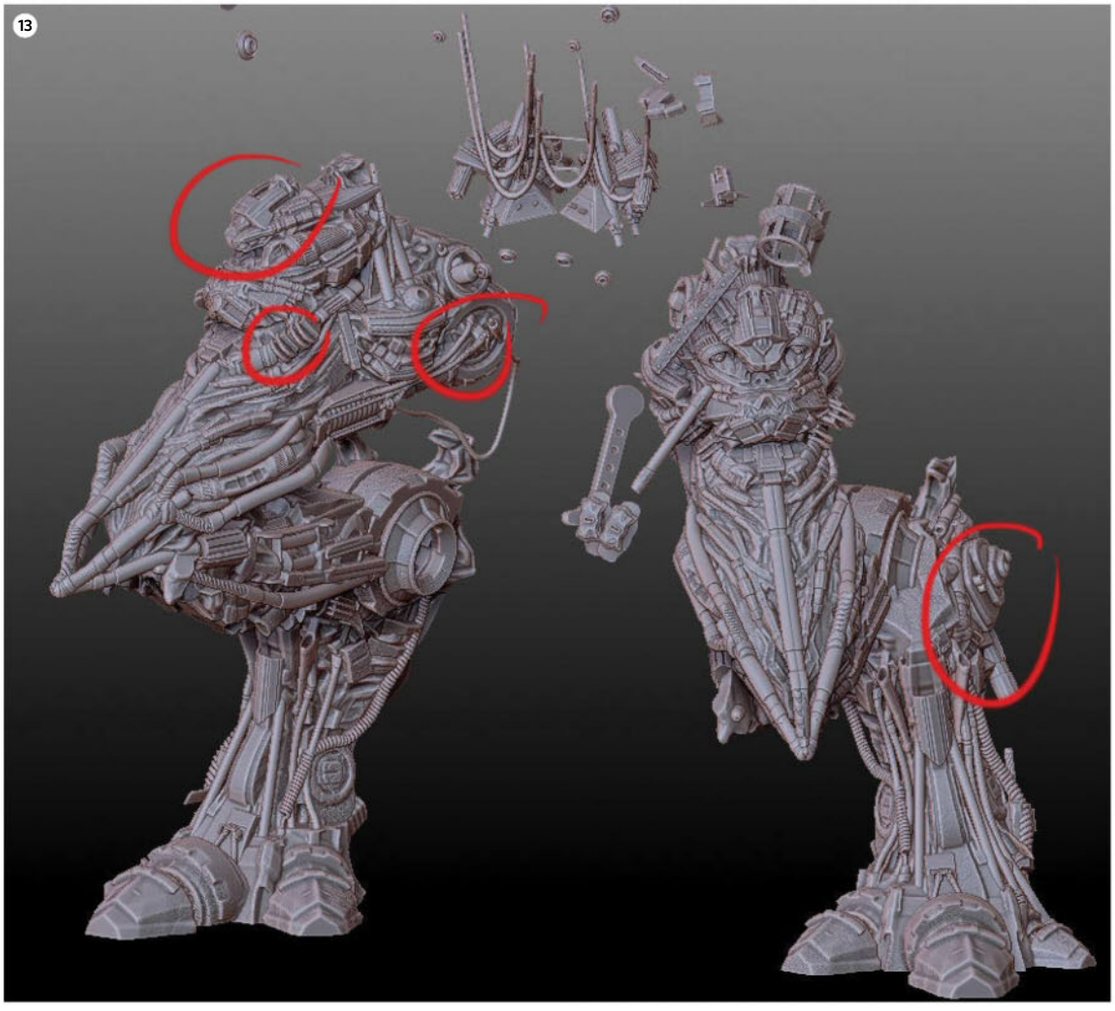


11 Hi-res with DynaMesh Once you have the desired geometry, polish it with the necessary SubD. It's then time to use DynaMesh again. This might seem like overkill, but it's all for a good reason. Applying DynaMesh with a higher resolution will conserve the finer edges and forms that we got from retopologising. By DynaMeshing, you can keep adding more shapes and by using the DynaMesh Subtract tool, we will have endless possibilities for more interesting shapes.

12 Create your own IMMs There are plenty of great sites where you can get amazing IMMs, but it's better that you create your own library. Simply make a specific piece – anything related to your sculpt – and create a new tool in which there are SubTools for machinery, like nuts, bolts and other metallic parts. Once you have several SubTools, decimate them first, then make them all visible. Go to the Deformations sub-palette and press Unify, then press Repeat To Other. This will avoid any scaling issues. Next, in the Brush palette, press Create InsertMultiMesh.

Don't stop creating

It's worth experimenting with your creations in order to build exciting new pieces. Create your own models, mix old designs together to create new ones and work with deformations, as these will lead to interesting results. When adding pieces to your sculpt, beware of oversaturating the model, as you don't want to overwhelm the image.



13 Kitbash with your IMMs As soon as you press the Create InsertMultiMesh button, you will have created your IMM, so save it for future use. With these IMMs you can start adding the necessary details onto your model. Don't DynaMesh it just yet though, as you need to be absolutely certain about your character. If you're not sure, group the elements into the same PolyGroup and then use the SplitByPolygroups function to split these into a separate SubTool. As soon as you *are* sure, DynaMesh it.

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Concept

The concept behind this image was to show the harmony between organic and hard-surface modelling and that both can be used alongside each other in a sculpt.

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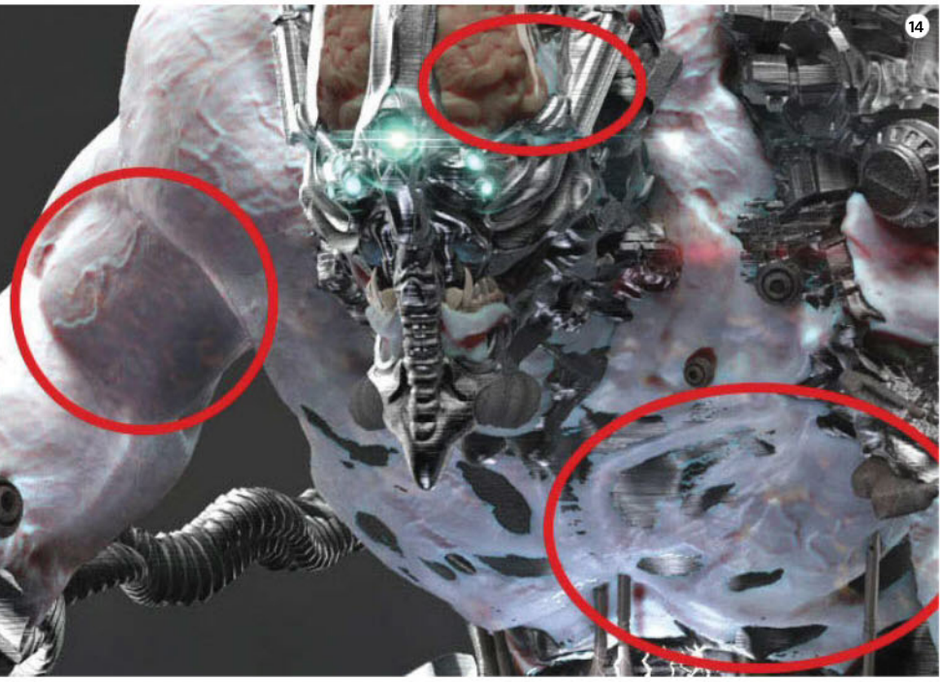
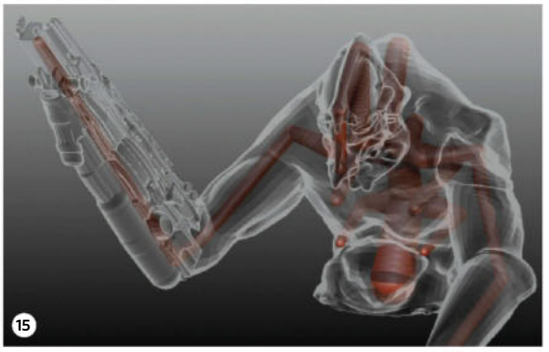
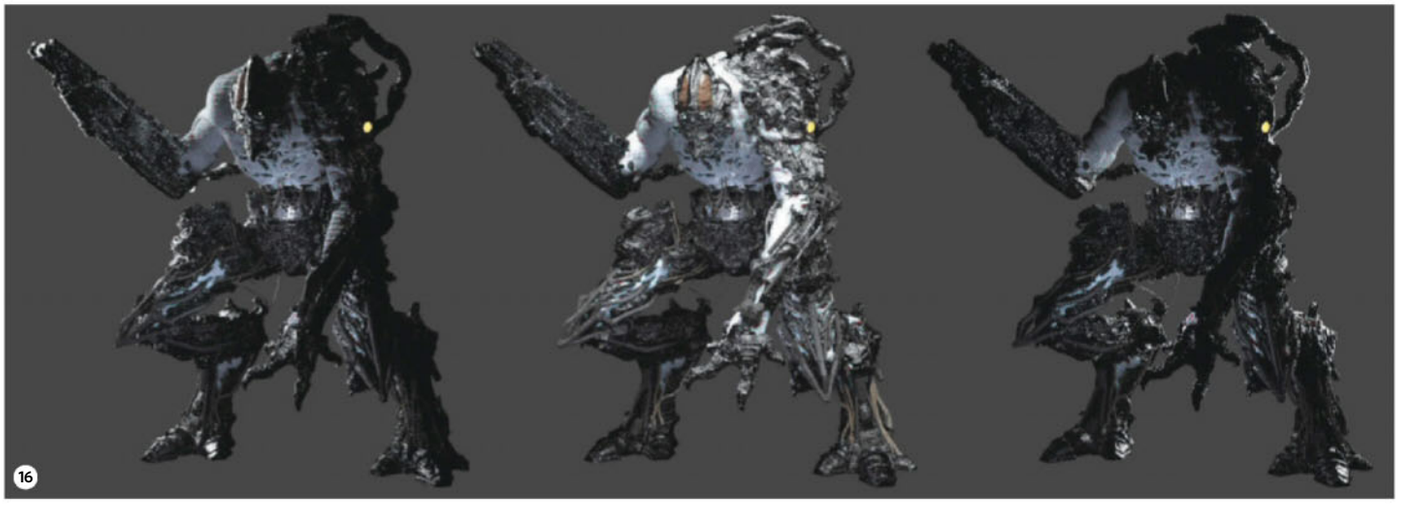
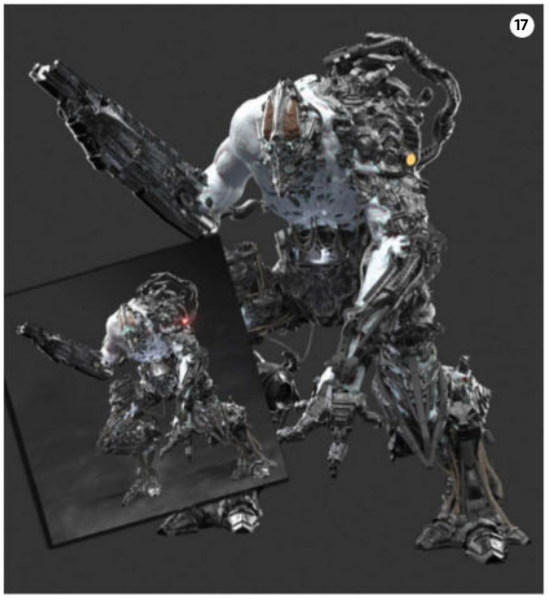


14 Texture based on reality You may have an exceptional sculpt, but the whole process can fall to pieces when it comes to texturing. Look at the world as what it is, and make sure that you keep your textures simplistic and realistic. Look at everything for spots, colour and angles. 3D is simply a simulation of this world, so you need consider the world around you as well as your character's. When it comes to painting your character's skin, begin on the darker parts, making use of different strokes, brushes and Alphas, moving on to the highlighted areas as you go on. Try to avoid the monochromatic feel as much as possible.







15 Add a pose You always have to analyse your sculpt and make decisions based on what you see as to how your character should be posed. If you decide to use a ZSpheres rig, some elements can end up being deformed by this, so it's best to choose wisely. In my projects, I tend to use the ZSpheres rig to move the upper body and to twist the torso and shoulders accurately. Once you're happy with how your model is posed, use the Transpose Master function to finish the job. Next, put into place all of the other pieces that have been left behind.

16 Light the scene The same goes for the lights on your scene. You can have a great textured sculpt, but if you miss how to position the lights, you can lose the chance to really show off your work to the best of its ability. Always look for highlights, shadows and strong shapes. As a rule, we'll use a Rim light, a Main light and a Fill light for any scene. Depending on the complexity of a sculpt, it might be worth adding Spot lights to illuminate those tricky areas. We will be using Spot lights for our model, as it's certainly quite complex.

17 Final touches Last of all, render your character. Once the render is done, add a few passes and then work on the final 3D still in Photoshop. Personally I find that it's best to get the final render as close to the final result as possible without having to render out loads of passes. This is particularly valid when you're using real-time software, such as KeyShot. Most of the time I find myself with simply a Clown and Depth pass. Once you've opened your final image in Photoshop, add a Level adjustment layer and a Brightness/Contrast adjustment layer. You can add any other adjustments that you want to really accentuate the realism of your character.

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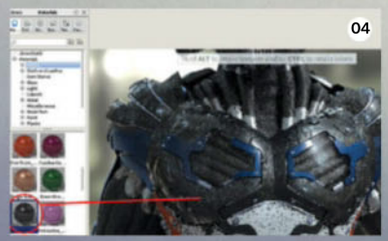
Technique focus

Incredible 3D artists take us behind their artwork

DETAILING ZBrush has all the tools to generate robots and armoured suits, from blocking out your character all the way to super-fine details. In particular, I used the Slice Curve tool and Panel Loops to create realistic sheets of armour. I finished the piece in KeyShot, utilising plenty of materials, with realistic lighting and environments. **Enkeron – Zion,** 2014

Richie Jon Mason

Website www.artstation.com/artist/Richenks
Location UK
Software used ZBrush, Cinema 4D, KeyShot, Photoshop
Bio Richie works with hard-surface modelling and character design

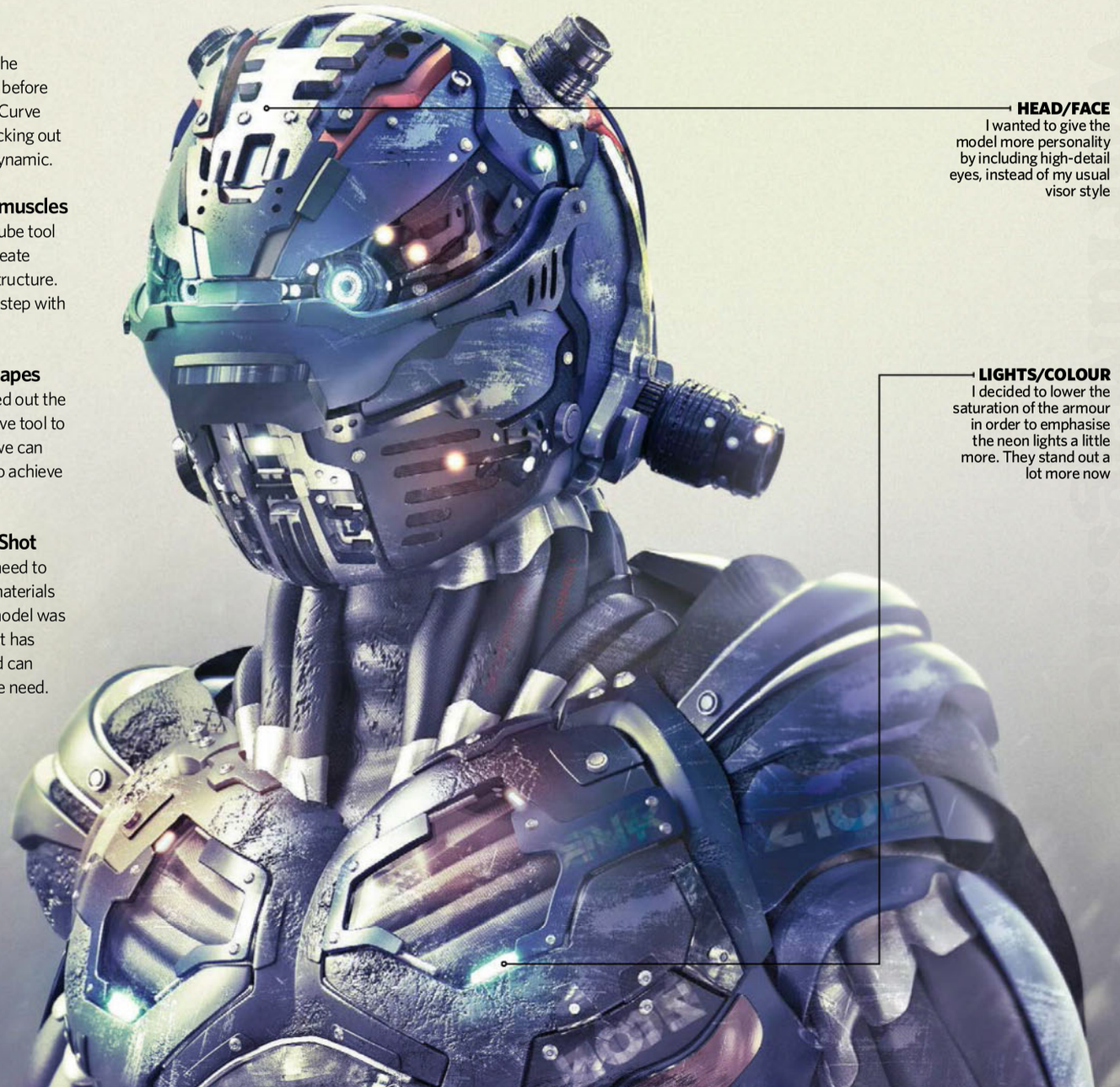


01 Block out This is the blocking-out stage, before we go on to using the Slice Curve tool. The main tools for blocking out are Move, Clay and Trim Dynamic.

02 Add wires and muscles Using the Curve Tube tool makes it fast and easy to create carbon wires and muscle structure. We can then conclude this step with hPolish and ClayPolish.

03 Cut out your shapes After we've blocked out the character, use the Slice Curve tool to cut out shapes. After this, we can use Split and Panel Loops to achieve a decent hard-armour look.

04 Texture in KeyShot At this stage we need to choose the right KeyShot materials to use, as only half of this model was textured in ZBrush. KeyShot has great tools for texturing and can provide the metallic look we need.



HEAD/FACE
I wanted to give the model more personality by including high-detail eyes, instead of my usual visor style

LIGHTS/COLOUR
I decided to lower the saturation of the armour in order to emphasise the neon lights a little more. They stand out a lot more now

NANO MUSCLE/TUBES
I used these to embellish the arms, neck and torso to give the whole thing more of a robot feel, rather than looking like a human in a suit

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Step by step

Easy-to-follow guides take you from concept to the final render

Aldo Vicente

Personal portfolio site aldovicentecg.wordpress.com

Country USA

Software used Maya, ZBrush, Photoshop

Expertise Aldo is a 3D generalist that specialises in modelling, materials, lighting and texturing

Texture a superbike and racer

Accelerator 2014

"A superbike racer accelerating down a stretch"

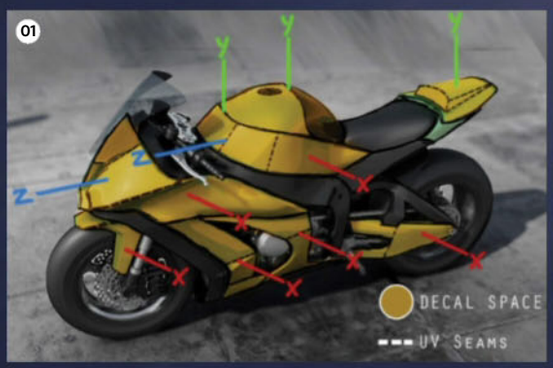
Aldo Vicente works as a 3D generalist creating imagery for marketing, advertising and 3D medical animations

In this tutorial, we'll go over some fast, effective and fun techniques for creating high-detail textures and decals. We'll be creating an image of a superbike and racer in a full racing suit tearing around a corner. The rider's suit has a complex design with a variety of fabric types, and is covered in logos. The superbike is also covered in decals and composed of different metals and polymers. We'll be using a variety of cool techniques to create textures for everything from the fabric detail, to the logos and decals, to the dirt, rust and debris. We'll start by looking into different theories and tools for quick and effective UV layout.

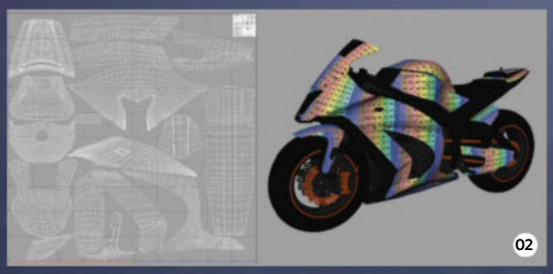
We'll be creating logos and decals then using layout maps to help assemble them into clean and accurate Texture maps. We'll also be creating textures to define our fabrics and to improve our materials. Over the course of this tutorial, we'll cover some fun painting techniques to help get consistently great-looking results quickly. Last of all, we'll use layered textures and shaders to help stack our logos and decals onto our fabric and metal materials.

Our goal here is to play around with various handy techniques, and of course, please feel free to experiment and expand to find what works best for you!

01 Plan out the bike's UVs A clean, distortion-free canvas for our textures will save us a lot of time and headaches in the long run. Laying out UVs can be a fun challenge when approached with the right kind of strategy. Let's consider our spatial priorities. Each section of our superbike has a solid colour base of either black or green. Solid colour sections need very little map space, meaning that we can designate lots of map space to our decals and consolidate the remaining UVs into a tiny coloured corner of our map. Plus, we can save a lot of time by only refining the UVs on sections that actually feature decals.



02 Lay out the superbike's UVs In Maya we can use Auto UV Mapping as a starting point. Next we'll select the decal-heavy sections, such as the windshield, the tail and the exhaust panelling, using Planar Mapping to cut them into separate shells. Consider which axis each surface is facing. Let's shrink the solid colour shells into a .1 x .1 corner, keeping the green and black shells separate. Refining our slightly curved decal shells is relatively easy with Unfold and Relax tools. Finally, we can organise our shells for maximum coverage in our 0-1 space. Remember that a uniform scale and orientation will make our lives much easier later on!



03 Create a template map Now that our superbike's UVs have been set up, we can start sketching out a template for our decal designs and layouts. Personally I like to use ZBrush's polypaint to sketch directly on the model. Let's bring our superbike geometry into ZBrush, activate polypaint, and coat it in white. Now we can use a Pen brush set to black to doodle in ideas for decals. Once we've found some cool designs and patterns, clean up the sketch and save it out as a map. This map will act as our template, and it will be extraordinarily valuable a little later on.

Thoughts on UV layout

When it comes to laying out UVs, regardless of what type of project we're working on, it's important to consider things like spacing, orientation, coverage, seam placement, resolution and work time. However, the order of priority is dependent on the project. Here, we're creating a pre-rendered still with lots of logos and decals. Therefore, factors like coverage, though important, become secondary as we're free to up the texture resolution. Orientation becomes paramount as it will save us from painting counter-distortion into our textures.

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Learn how to

- Tips for laying out UVs
- Texture-painting techniques
- Use layered materials/ textures
- Use textures to improve materials

Concept

By working on this project, I hoped to create an image that conveyed a sense of incredible speed, sound and gravitational force. This is hopefully shown with this racer accelerating out of a sharp turn.

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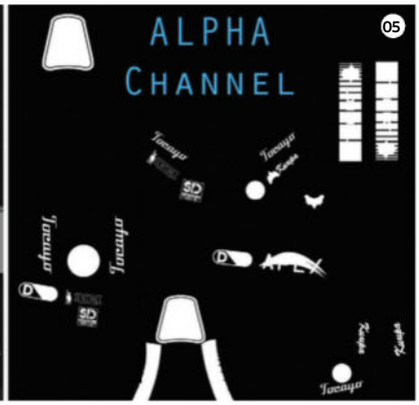
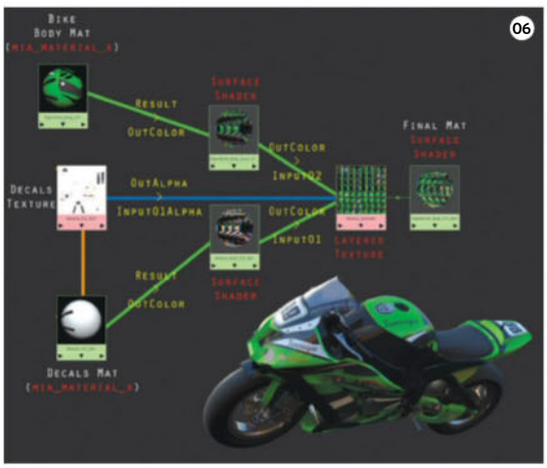


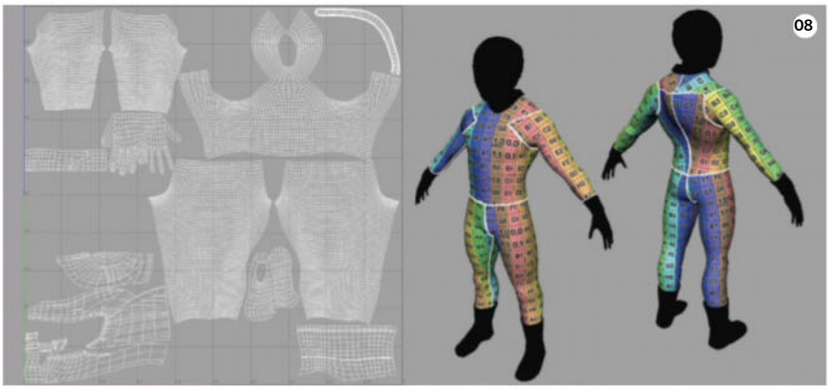
04 Create the decals Here we'll be taking our ideas and fleshing each one out into a polished-looking logo or decal design. A lot of these decals will be used on both the bike and the rider, so we should create and save each one out individually for assembling later on. Logo and decal design is an artform in itself, so remember to gather lots of reference images and inspiration. Let's start by doubling our template's resolution. This will help to ensure that all our logo files are substantially sized. Remember to keep each design on a transparent background.



05 Assemble the decal texture Now that all our decals have been fleshed out, let's bring them together to assemble our texture in Photoshop. Open up our standard-resolution template and start importing decals. Once we've scaled and sorted them into place, remove the template and merge all the decal layers into a single Diffuse texture. Create a new Alpha channel, then select the positive space of our Diffuse texture and fill it white in the Alpha channel. Save the texture in an image format that supports Alpha channels, like 32-bit TARGA.

06 Add decal textures to our materials In Maya, create a decal material and a layered texture shader, then drop them into the Hypershade workspace with our superbike's body material. Next we'll bring our decal texture in with a 2D File node and plug it into the Diffuse Color of our decal material. Now we can stack the two materials into the layered texture shader, with the decals on top (left). Next, connect the Alpha out from our decal texture to the layered texture shader's Input01>Alpha. Last of all, we'll create a surface shader and plug the layered texture into the Outcolor and apply that to our superbike.

07 Plan the racer UVs Creating textures for the racer is going to be more challenging than the bike because in addition to a decals/logos texture, the racer needs textures for suit and fabric details. For this, we'll need to create two UV sets for our racer geometry. The logos' UV set will be similar to the one we created for the superbike. Maximise space for the areas with logos, and confine the empty sections to a small corner. The second UV set will be a more traditional UV layout, with a complete, even unwrapping. This will be our suit UV set.



08 Create the suit UV set Let's create a new UV set for our suit in the UV Set Editor window. We want the suit UV set to be a full, traditional unwrapping of our geometry. This UV set will be used to create textures for the suit details and fabric. We can break our model up into a torso and four separate limbs and then Unwrap and Relax each island like we would a cylinder. I like to keep a vertical orientation on everything, as this will make it easy to keep a consistent fabric pattern while creating our textures later on.

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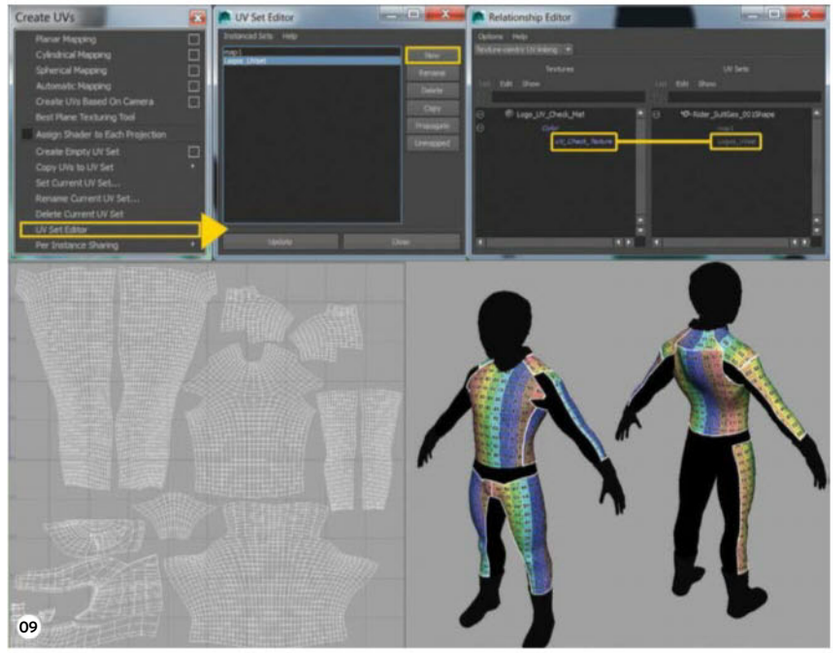
09 Create the logo UV set The next step is to make a new UV set for our rider geometry in the UV Set Editor. Let's select our suit geometry and run an Auto Unwrap. Now, let's use Planar mapping to lay out the planes that will feature the majority of our logos. We'll take the remaining UVs and shrink them into a small corner. Let's make sure we have uniform scale and orientation on our logo UVs. Last of all, we'll flatten out our logo canvas. Maya's UV Texture Editor can get the job done, but remember to try out some of the other great UV tools outside of Maya.

10 Normal maps, Displacement maps We'll be creating our Displacement maps, Normal maps and AO maps in ZBrush. These maps will be our guides for painting our suit textures. Let's import our suit geometry, making sure the suit UV set is assigned. Now we can sculpt in our suit detail to project onto our Normal and Displacement textures. At this stage, we don't want fabric texture. We only want to convey the way the suit is stitched and constructed, and how the fabric folds and bends around the stitching. Once our details are ready, generate Normal, Displacement and AO maps.



Manage your colours

I used a linear workflow to ensure that all the incoming and outgoing colours – whether they're from textures or colour swatches – are balanced into a uniform, linear colour space. Understanding colour management and how to establish a linear workflow is important for getting the most realistic and accurate results, so it's absolutely worth researching. For a quick setup, let's enable Color Management in the Render Settings window. Now we can use Gamma Correct nodes to balance our colour swatches. We can label our colour textures as sRGB, and we can label our Bump, Normal and Displacement as Linear sRGB.

11 Sketch the logo template Similar to how we sketched on the bike earlier on, we want to sketch in a texture to use as a guide for our logo placement later on. In ZBrush, be sure to import a suit model with the logo UV set. Again, we'll coat the mesh in white and draw with a Pen brush set to black. This time around, we need to consider the size and aspect ratios of our existing logos and find cool ways to distribute them across the surface of our suit. Note that unlike the superbike decals, these logos are asymmetrical, with each appearing on one side only.

12 Flat Color pass Let's start making our suit texture in Photoshop. We can use our AO maps as a template while painting in our textures. Start off with a flat Color pass. We are essentially filling in the base colours of our fabric panels. In this step we're not concerning ourselves with details like wrinkle shading, fabric type, grunge, seams or stitches. We should make a selection out of our AO map and simply fill in with flat, solid colours. Be sure to keep each different colour on its own layer for further adjustment later on.

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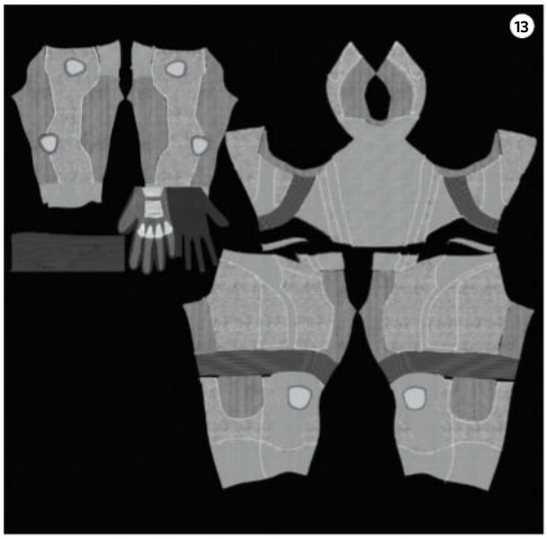
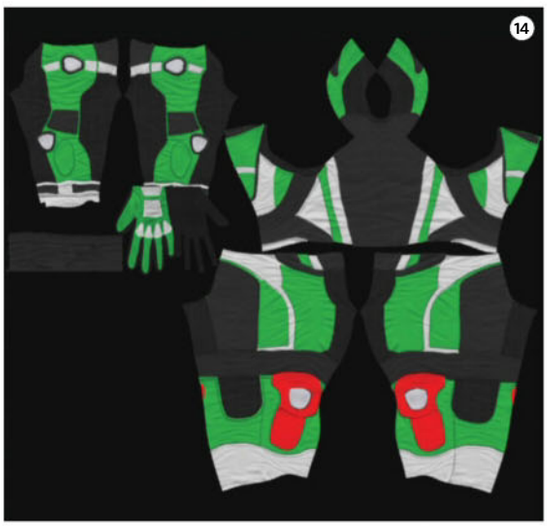




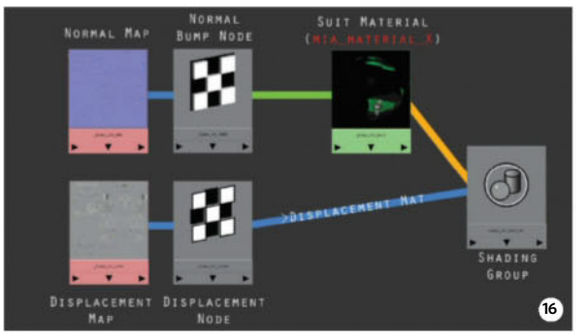
15 Create the logo texture With our suit textures ready to go, we can move on to creating our logo texture. This process, again, will be similar to creating the decal texture in Step 5. Let's load our logo template texture into Photoshop and start importing our pre-made logos. Use the logo template that we made earlier in order to quickly pop the various logos into place. When all logos are positioned, we can hide our template, merge the layers and create a new Alpha channel using the positive space from our logos layer. Before moving onto the next step, we can save out our logo texture as a 32-bit TARGA.

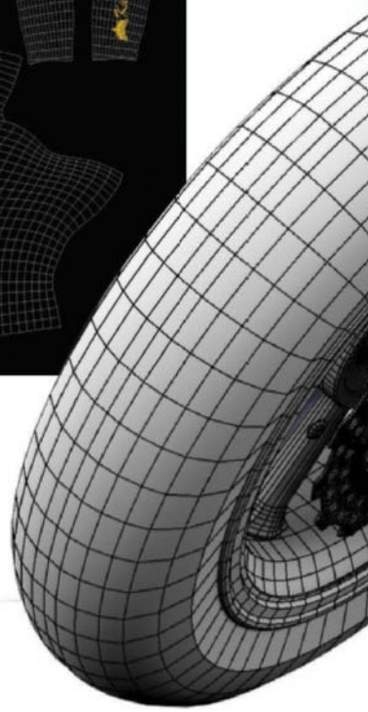
Bump map tips

There are some great tools out there for creating effective Bump maps from photo images, and it can be fun and helpful to go out and photograph new textures. Having control over framing, scaling and lighting can be very beneficial when you're working on such a highly detailed image. We can manipulate our levels in Photoshop to create some really effective Bump maps. For our fabric Bump map, I collected photo textures for each of the fabric types in our suit, then balanced out their values, adjusted scaling for accurate comparative proportions, and then set a uniform orientation. This gives us an excellent starting point for creating our Bump maps.

13 Fabric Bump pass Let's create Bump textures that will convey what type of fabrics are in our suit. We're keeping this Bump detail separate from the suit structure detail in the Normal map. To create our Bump maps, we can use photo textures of the actual fabrics that we're trying to simulate. There are some great tools out there for creating Bump, Normal, or even Displacement maps from flat images, but I've also found it easy to create excellent Bump maps by simply desaturating photos and manipulating the levels. We should balance the levels for all our fabrics to fit within the same range.

14 Fabric Color pass I've found that we can make our Bump textures even more convincing by integrating the same detail into our Diffuse texture. First off, make a copy of our fabric Bump pass and set them over our solid Color pass. We can set our fabric colour layer's blending mode to Multiply to bring the fabric patterns into our colours. Next, we need to adjust the value levels of our fabric Color pass. When set to Multiply blending, adjusting the levels affects the Opacity. The more white, the more subtle our fabric colour texture will be.





16 Prepare the suit material It's now time to create the base material for our suit. I used mia_material_x. We'll be adjusting the Shading attributes later on. Create a 2D Bump node and plug in our Normal map, setting the Bump type to Tangent Space Normals. Let's apply this material to our suit geometry and then apply a Displacement node to the Shading group. Plug our Displacement map into the Displacement node. Remember to label Displacement and Normal maps as linear maps, and to designate them the suit UV set. Lastly, we can set up Subdivision Approximation on our geometry to refine the effects of our Displacement map.

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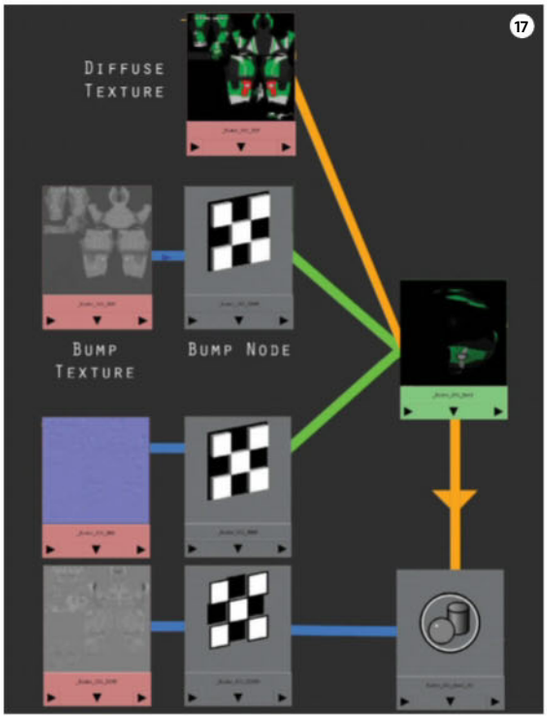
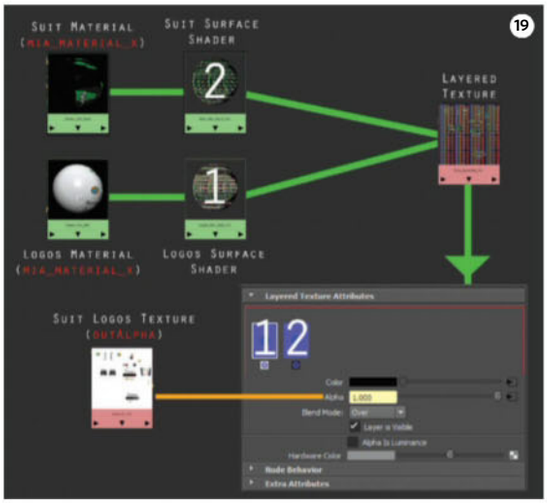
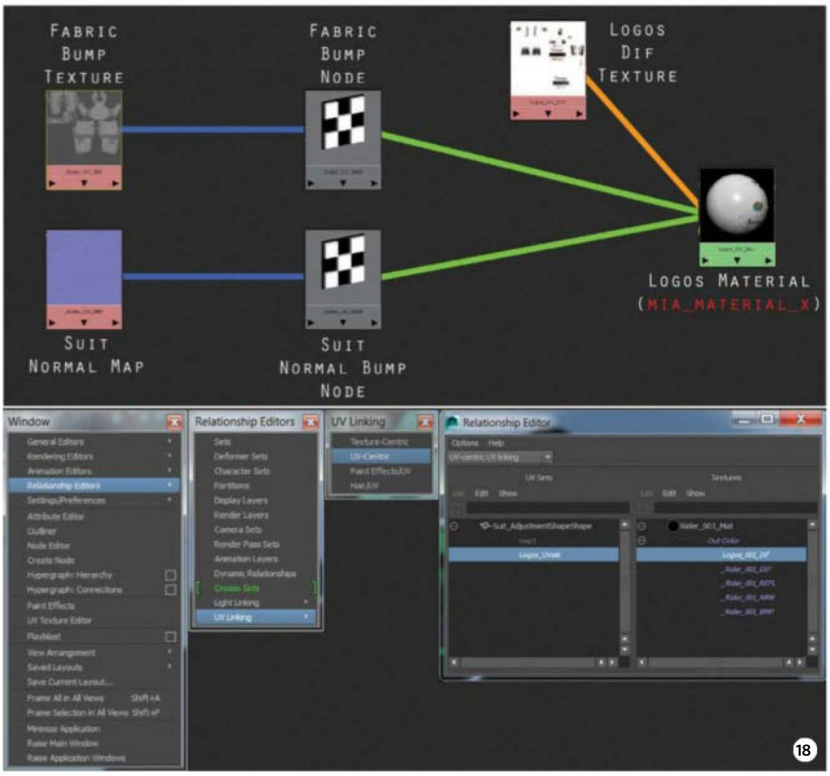


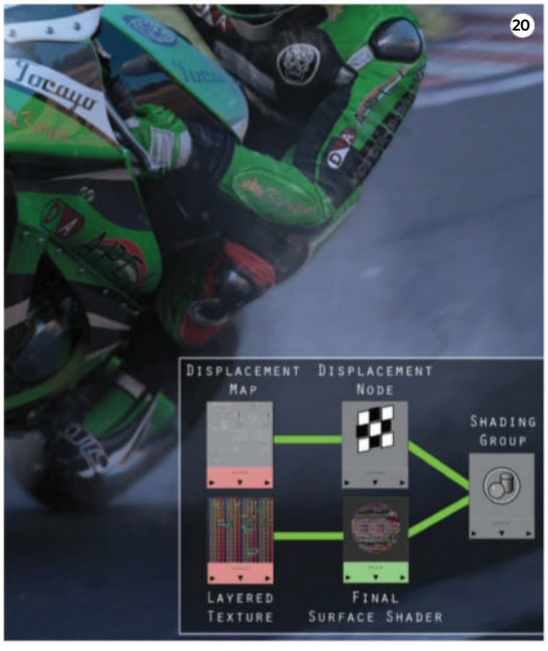
17 Apply the suit textures Now that we have our base suit material set, create a 2D File node and bring in our suit's Diffuse texture. We'll be plugging our Diffuse texture into our suit material Diffuse attribute. Be sure that the Texture Input Profile is set to sRGB. Next, we'll create another 2D File node and bring in our suit Bump texture. Our Bump texture should have a Linear Input Profile. Since this is very subtle detail, our Bump value should be set low. Finally, connect the 2D Bump node into the second Bump slot on our suit material.



19 Layer our materials With our suit and logo materials ready, it's time to start layering. Drop the two materials into the Hypershade workspace with a new layered texture shader. Before we drop them into our layered texture, we need to plug the result of each mia material into the Outcolor of a new surface shader. Now we can drop these surface shaders into the layered texture, with the logo material on the left-hand side. Finally, let's select the logos' texture file, and connect the outAlpha, to the Alpha attribute of the logos' surface shader (input01) in the layered texture shader.



18 Create the logo material Make a material for the logos. Looking at reference, we can see the logos' material sits over the suit fabric, so this material will not share the suit's fabric detail, but it will carry the suit's structural detail. So, let's start by applying our Normal map. Next, we can us a 2D File node to bring in our Logos texture and plug it into the Diffuse slot of our Attribute Editor. Our logos' texture will not be using the suit UV set, so let's be sure to assign the logos UV set in the UV Texture Editor.



Adding layers

In these examples we only stack two materials at a time, but if we want to add detail, we can use the same process to continue stacking new materials on top of what we already have. If we want to add grunge with its own material properties, start by creating a grunge texture with an Alpha channel, featuring only the grunge detail. In Maya we can create our new grunge material, plug in our texture, and then stack it on top of our layered texture. Finally, we can plug the texture outAlpha into the layered texture.

20 Final suit material Now we'll set up our final rider material in a new surface shader. We'll take our layered texture shader and plug it into the Outcolor of our final surface shader. Now we'll apply our final surface shader to our suit geometry. At this point, we have our suit's fabric and structural detail in place, with the logos ironed over the top. Since our geometry already has subdivision approximation set up, the last thing we need to do is to connect the Displacement node we set up earlier and plug it in to our final materials Shading Group.

• **DID YOU KNOW?** • All tutorial files can be downloaded from: filesilo.co.uk/3dartist-75

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2013 Scientific and Engineering Award To Ofer Alon for the design and implementation of the ZBrush software tool for multi-resolution sculpting of digital models. ZBrush pioneered multi-resolution digital sculpting, transforming how artists conceive and realize their final designs. ZBrush has enabled artists to create models far more quickly and with much greater detail than previous approaches.

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Technique focus

Incredible 3D artists take us behind their artwork

LIGHTING To light this project, I used V-Ray with a setup made up of one Front V-Ray light, two Back lights and one Top light. Then, to create the reflection for the environment, I used an HDR image. For post-production I rendered four separate passes: a Reflection pass set to Soft Light, Ambient Occlusion that was set to Multiply, Zdepth and Wirecolor. **BMW z4 gt3,** 2014

Ulianov Denis
3DArtistonline
Username: dakeda

Website
www.vk.com/sketchbook_by_dakeda
Country Russia
Software used 3ds Max, Photoshop

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Step by step

Easy-to-follow guides take you from concept to the final render

Bruno Câmara

3DArtistonline

Username: brunocamara

Personal portfolio site www.brunocamara.com

Location Brazil

Software used ZBrush, 3ds Max, Mudbox, Photoshop, Ornatrix, V-Ray

Expertise Bruno specialises in all aspects of character creation, from sculpt to render

Sculpt a fantasy creature

Werewolf 2014

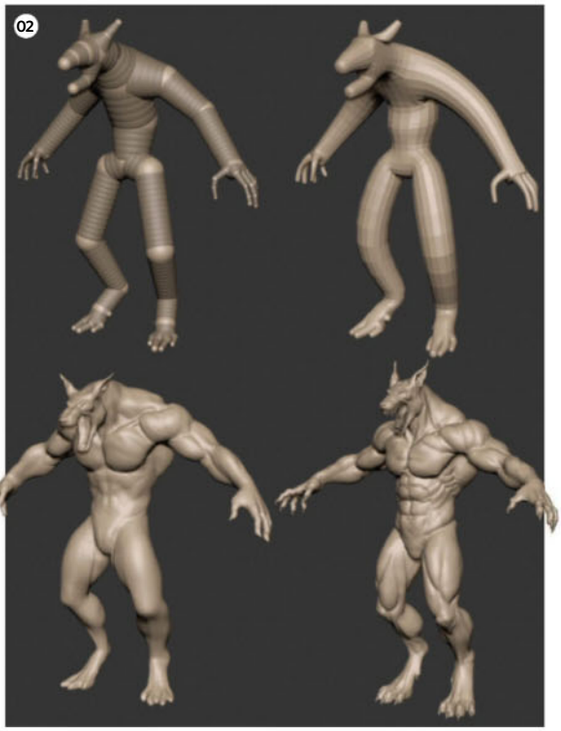
> Create a scary, harrowing image of a werewolf that looks as if it has leapt straight out of a horror film

Bruno Câmara works as a freelance character artist, specialising in organic and hard-surface modelling and texturing of characters for games, film, advertisements and 3D prototyping

When it comes to sculpting a character, it can be a complex and time-consuming process. In this tutorial I will describe my workflow and techniques for creating high-poly cinematic characters. We'll also take a look at how to sketch and use ZRemesher to speed up your retopology work. It's important to learn how to handle hard surfaces and organic surfaces, high-poly detailing and posing, as well as how to use Mudbox in a pipeline. I'll cover how ZBrush, 3ds Max, Mudbox, V-Ray, Ornatrix and Photoshop can help in every step in order to create characters. Last of all, my main goal is to open your mind up to smart, clever ways of creating character art.

01 Search for references Before starting you character, grab a load of references that will assist you all the way through the process and put them in a single PSD file, as it's easier to have them all together. Grab references, such as body types, similar 3D works that already exist, related sculptures, pictures of people and nature. You can also look for body features, such as veins and wrinkles. It's worth finding images of objects for shading references, particularly for metals, leathers and wood. For example, in this project I grabbed pictures of furless dogs, skulls, axes and yellow leathers. You can grab these as you carry on along each step. From start to finish of a project, I'm constantly searching for pictures to help me.

02 Block and sculpt the body When a character is human or a human-like creature, I like to start from a base mesh that comes with ZBrush: Nickz_humanMale.ZTL, which you can find on the Lightbox. However, for more complex structures, such as the werewolf's body, start from ZSpheres. At this stage we can sculpt everything that matters for a nice retopology, including the anatomy, muscle definition, hands, face, eyelids, nose and ears.



03 Use ZRemesher for retopology Now that every feature on the body is sculpted, use ZRemesher to create the main base mesh. First, duplicate the body to keep the original safe. On the copy, decimate it to reduce the polycount so that ZRemesher can calculate it faster. Also, make use of the ZRemesher Guides brush to create more precise edge loops on the face. I often use the Use Polypaint function in ZRemesher to increase the amount of polys for the face and sometimes for hands and feet. Generally I add three-times more polys for the head.

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Tutorial files:

- Scene files
- Textures
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Learn how to

- ☑ Sketch a creature's body using ZSpheres
- ☑ Generate the body mesh with ZRemesher
- ☑ Prepare UVs using 3ds Max and ZBrush
- ☑ High-poly detailing tips
- ☑ Texturing tips using Mudbox and Photoshop
- ☑ Lighting, rendering and compositing tips

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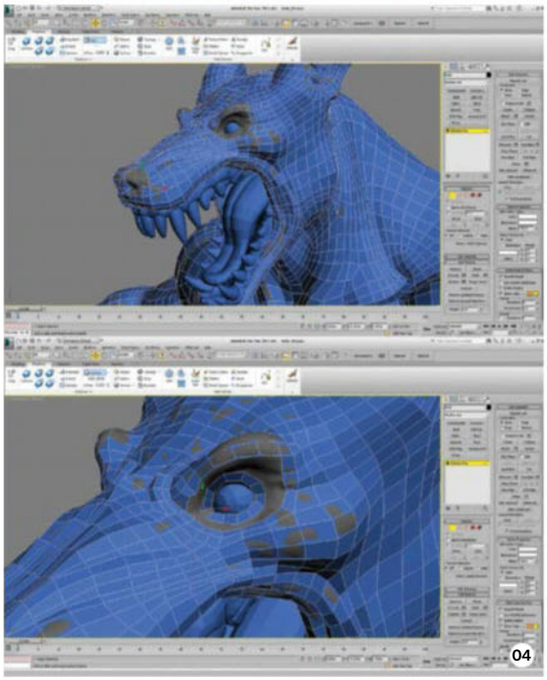
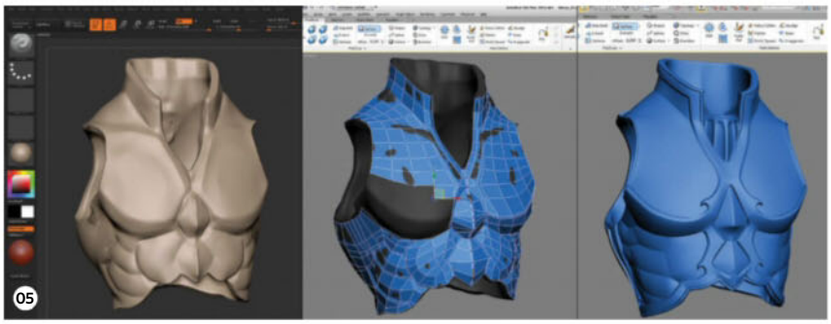


04 Fix issues manually Once you are happy with ZRemesher's result, you can export it to your favourite 3D software to fix some of the minor issues that may have occurred, such as undesired loops or weird topology on specific areas. I use 3ds Max's Graphite Modeling tools for retopology and I usually find that I have to fix areas like under the nose, or define more edge loops on the eyelids or lips.

ZRemesher is the key

I find that ZRemesher saves a huge amount of time, as it instantly does from 80 to 100 per cent of the retopology work – just beware of the spirals problem it creates. Thankfully there are plenty of useful tutorials out there that help to get rid of these issues.



05 Props modelling – hard surfaces Start modelling props in 3ds Max, including the bases for clothes, leather props, leather belts or other relatively simple props that can be easily created from Primitives. Now, there are both simple and complex hard-surface props. For the simple ones, start from scratch in 3ds Max using old-school box modelling. For the more complex hard-surface props, such as fancy breastplates, metal masks or shoulder pads, make a sketch in ZBrush using DynaMesh and then when it's done, export it into 3ds Max so that you can retopologise it using the Graphite Modeling tools. The example shown in the screenshot is a breastplate for another personal work.

06 Props modelling – organic props Organic props are all those that you can model entirely inside ZBrush, meaning you can sketch and use ZRemesher to create their base meshes. These include animal skulls, horns, teeth, tongues, nails, or the rustic leather trousers that our werewolf is wearing. All you have to do is to create the shapes using DynaMesh and then set up ZRemesher to create its base mesh with your desired amount of polys.

Artist showcase

Bruno Câmara

My traditional art background and passion for creatures and special effects was crucial for my current CG career. In 2005 I started an intensive CG course and after ten years working in the industry I'm now a freelance character artist specialising in organic and hard-surface modelling and texturing of characters for games, cinematics and advertisements.

Akuma
ZBrush, 3ds Max, Mudbox, Photoshop (2013)
This is a character that I made for the Fighting Games Challenge at ZBrush Central

Goku
ZBrush, 3ds Max, Mudbox, Photoshop (2013)
A character that was made for the *DBZ* 3D Fan Art Challenge at ZBrush Central

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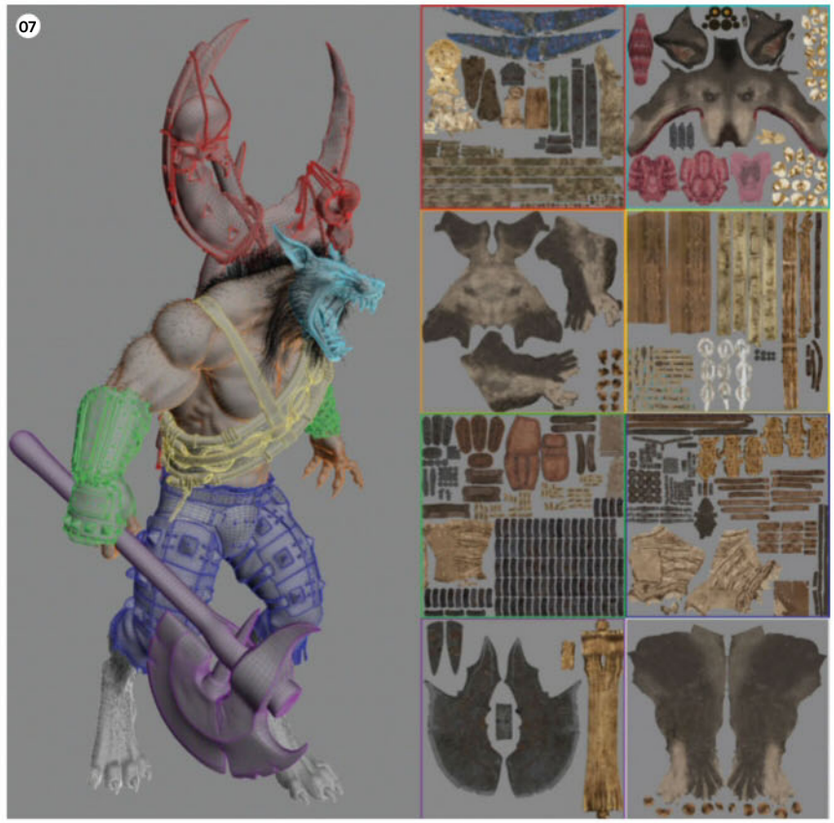
07 UVs After modelling everything, it's UV time. Before making UVs, ensure you delete the hidden parts of props, such as under belts, inside clothes and so on. This way making UVs will be much easier and you won't waste UV space. For simple props, export them to ZBrush and use UV Master (Zplugin>UV Master) to make its UVs. For more complex ones that you need to precisely cut the UV seams, cut them in 3ds Max, export to ZBrush and in UV Master setup, make sure to activate Use Existing UV Seams. ZBrush will respect your custom seams. Once you have all props with UVs, attach them into eight to ten UV spaces and separate them by materials. Depending on the character, it may have too many metal or leather parts, so you will need to create two or three UV spaces just for these parts, such as upper metals, middle metals and so on. For this werewolf you can separate them by asset, but I recommend that you separate by material, as it makes things easier at the texturing stage.



08 High-poly details Now it's time to export everything to ZBrush. Before that, detach the props and split them into sections that will become SubTools, making sure you don't have too many objects in the same SubTool. This means that you won't have to subdivide too much in ZBrush. Select everything and export them as OBJs and import them into ZBrush. They will appear as one single object, but with all PolyGroups separated as you detach them in Max. You just need to hit Groups Split (SubTool>Split>Groups Split). Start detailing one by one, subdividing it enough to get your desired detail. Feel free to use plenty of reference images to inspire you. Before you start detailing, hit Morph Target>StoreMT to keep the original shape safe and to create the details in layers.

Hand-crafted details

Think of how the props are crafted and how they would be built in the real world. This way you can add details like metal joints, connections and attachments. Don't let your props float around the character – add some details to show how they are attached to the model.

09 Pose with Transpose Master Once we've finished all the detailing work, it's time to pose the werewolf using Transpose Master. Hit Transpose Master>TPoseMesh to enter the Posing mode. If your character has a lot of armour, you will have to hide pieces that you don't want to deform before you start posing. One very important thing is to save your posing progress. You can do this by holding Opt/Alt+TPoseMesh in order to save a GOT. In case of any crash problems you may have, you can easily open your original file (without pose) and load it using Opt/Alt+TPose>SubT and select your previously saved GOT.

Steampunk Cyborg **ZBrush, 3ds Max, Mudbox, Photoshop (2014)**
A steampunk cyborg based on a concept by Young Hwan Lee

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10 Export to 3ds Max When you're done with the pose, hit TPose>SubT to bring back your SubTools. Now you can export your character back to 3ds Max. However, right now your SubTools will be all separated. I like to export them back as the UV groups that I made. For example, I merge all SubTools that share the same metals UV. To do this, simply hide everything but the metals and hit Merge>Merge Visible. Don't forget to activate the UV option so you don't lose your UVs. ZBrush will create a clone of all the metals together on the Tools palette. Now you can export it as an OBJ file.

11 Export to Mudbox If needed, we can export some of the props to Mudbox. Export them as decimated models so you keep the detailing work intact. For example, suppose you want to texture your character's metals in Mudbox. First, decimate all of the metal SubTools (usually I decimate up to three to five per cent of the polygon count) and when you decimate them all, merge them using the same technique above (Merge>Merge Visible) with your UV option activated. Be careful to never merge SubTools with different UVs.

References for everything

Check references for the stage you're working on, including for ZBrush details and for posing. Get up from the chair and make the pose you want for your character, memorise it and apply it to your character. The goal here is to achieve a natural and physically possible pose.

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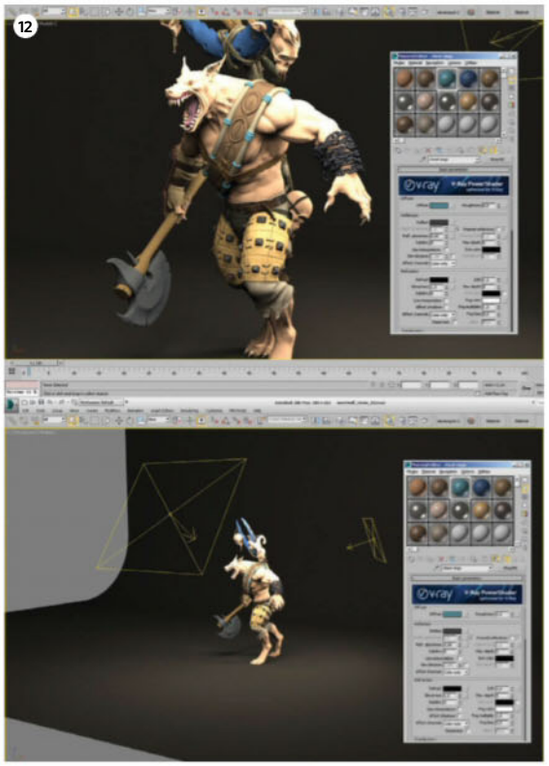
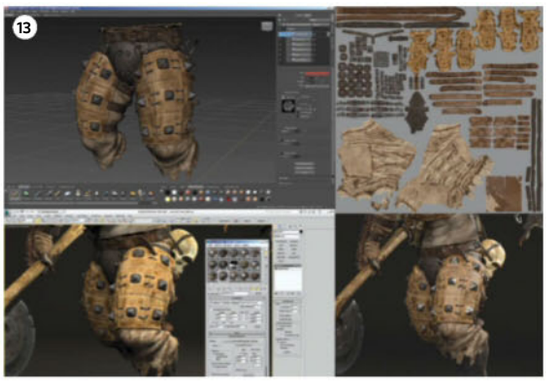
12 Set up the character's lighting and materials

The next step is to set up your scene, to set up Gamma 2.2 and to create your lights. I've been using VRayLights for this. I recommend that you check out pictures of iconic statues in galleries and museums, as you'll find that these are lit so beautifully, making them ideal to use as references. Basically your character must look good with a basic grey material on your lighting setup. Once your lights are working, you'll need to set up your shaders and make them work for your lights. Use VRayMtl for them and adjust your metals, leathers, clothes and so on, always checking your reference images to match their colour, reflections and glossiness.



13 Texture your character

When it comes to texturing, this is one of the most important steps, so it's vital that the textures work on the render. You can add dirt details and a more worn look, but ensure that you pay attention to the references you collected, as they show everything you need to make a plausible texture. In Mudbox, import your decimated OBJ, create a new paint layer and start painting specific texturing details, such as worn edges for leathers, gloss variations for metals or scratches. Mudbox is really intuitive and its painting layers work just like Photoshop. You can export these painting layers as a PNG file and compose them in your PSD file of your textures. Also, don't forget to export your Normal and Displacement maps from ZBrush.



Concept

I've always been a great fan of Paul Bonner's artwork. It's his paintings of werewolves that have provided me with inspiration for my own 3D interpretation.

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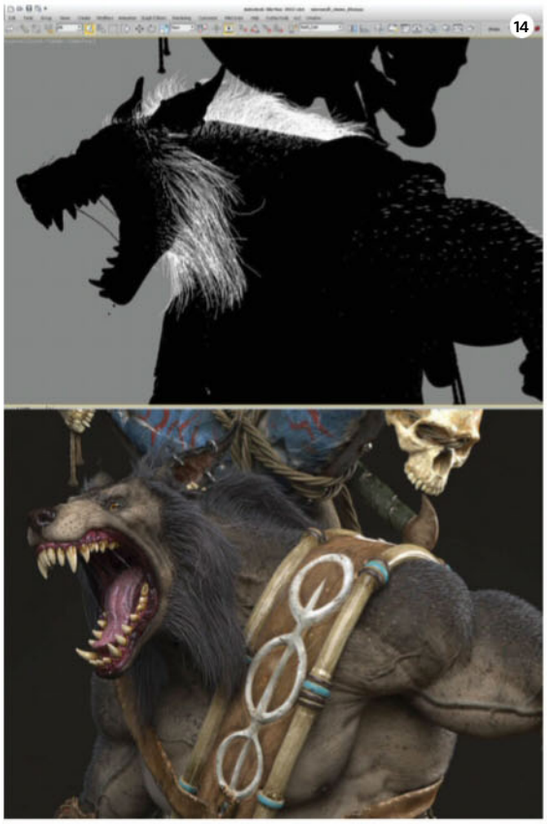
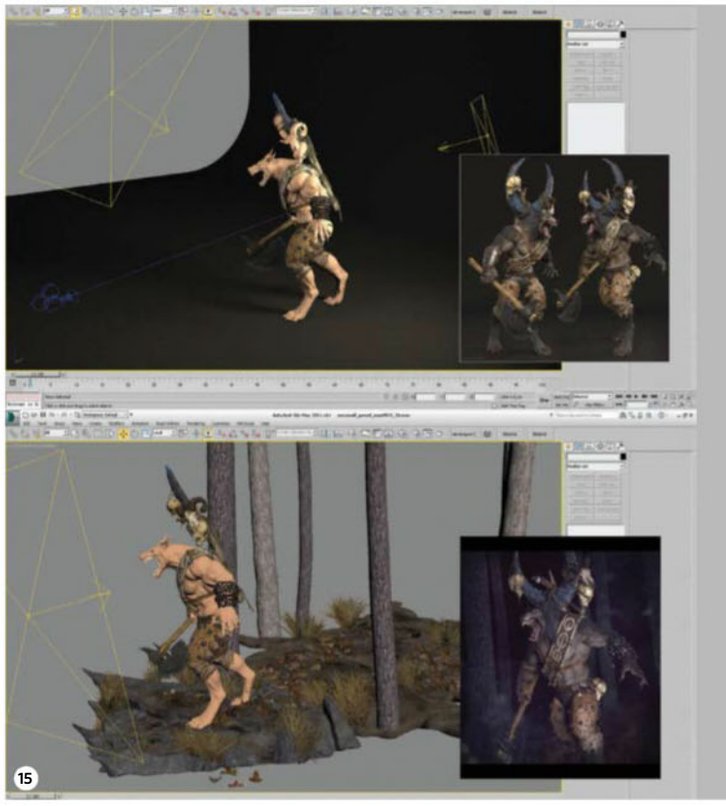


Be productive and creative

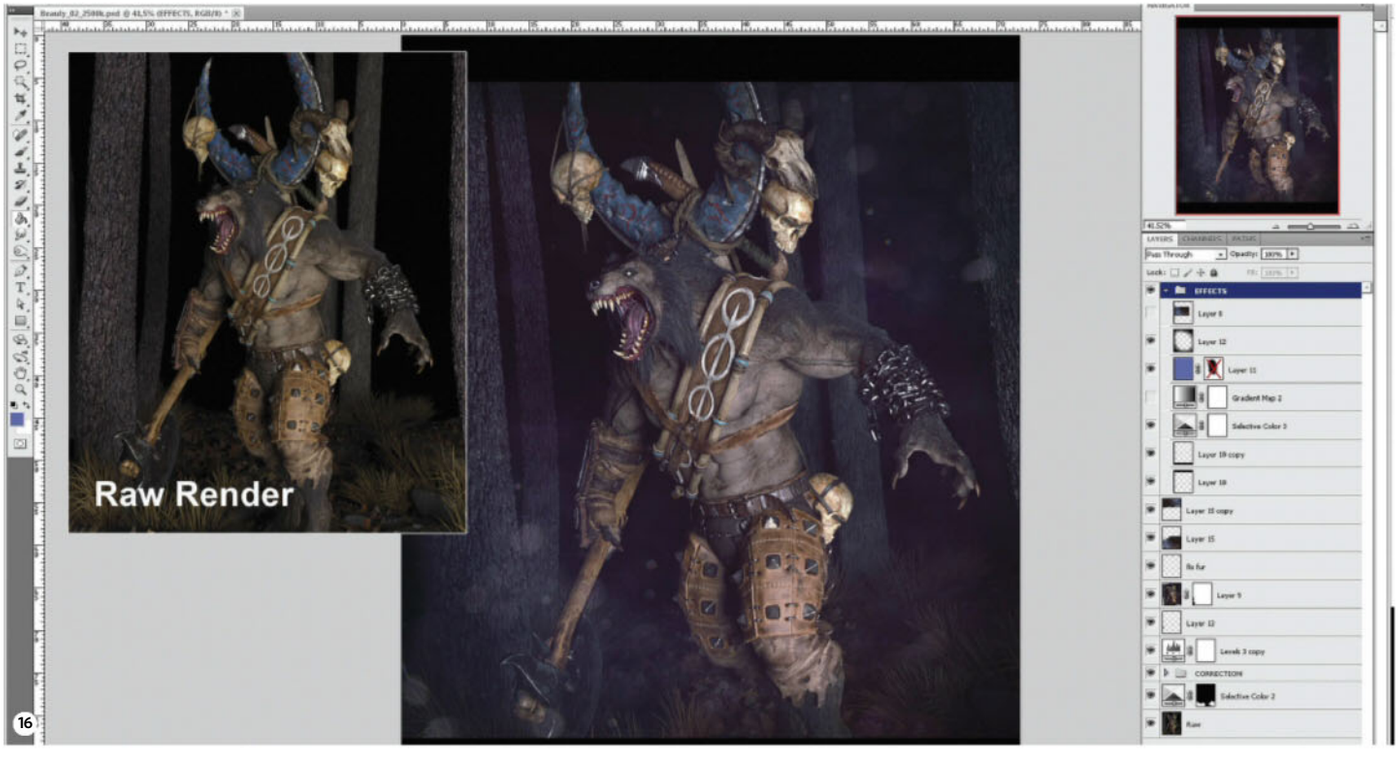
There's no point getting too attached to physically accurate effects and renderings. In the end, what really matters is a great result. It doesn't matter how you achieved that incredible look, so long as some fast and nice effects can be easily added in Photoshop.

14 Hair with Ornatrix There are three techniques that I like to use for hair: ZBrush FiberMesh, hair planes or Ornatrix. For this werewolf I used Ornatrix, as it's an easy and stable tool. Just like 3ds Max, it's based on modifiers, meaning you can basically control anything. For the werewolf, create four parts in Ornatrix: the head, back, arms and legs. Each one needs its own independent setup, but all should share the same VrayHair material.

15 Render For me, shading, texturing, lighting and rendering all go together, and at this final stage, everything must be working perfectly. Let's create two renders for it: a complete night scene and a simple 360-degree presentation scene. These can be inspired by references. For the night scene, create tree trunks, a ground with leaves and grass, then add one VRayLight to light it as if it's a camera flash. For the 360-degree scene, it's the traditional three-point lighting setup, and for the Fill light, add a VRayHDRI at GI Environment.



16 Final compositing Don't bother rendering any separate passes, such as Specular or Rim lights. Try to render it all together so that the compositing stage is just for levels or colour adjustments and to fix minor issues. If your character demands some effects, I recommend doing them at this stage. These include fire, sparks, power energy, fog, camera dirt, a vignette and so on. For this werewolf, I simply added some fog and camera dirt in Photoshop.



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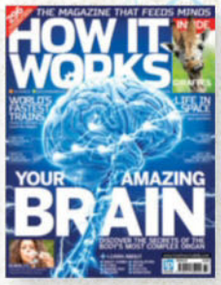

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Back to basics

Luis San Juan Pallarés is a character TD with plenty of experience in film and advertising

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Make a spine rig for a quadruped

Setup of the spine in a cow. Model courtesy of Alex Huguet and Frank Barton Company

> This tutorial is all about creating a rig in Maya that is both intuitive and easy to use for animation, and that can create appealing and functional deformations

A good rig must have two separated hierarchies: one for animation and another one for deformation. The one we will animate is called control rig and should be the only element the animators need to key.

Having a double hierarchy gives us the option of replacing the control rig in the future if we need, without having to redo the deformation part of the rig and vice versa. Another advantage is to bake all the motion from the control rig in the deformation rig after the animation is approved. This is useful for character, VFX and crowd systems. Eventually we won't need the control rig anymore, so we will be able to delete it to make the setup lighter.

When planning an animation rig, the best thing to do is to speak with the animators to figure out what range of motion you need to achieve and how you expect to manipulate the rig.

In the case of a quadruped spine, the usual requirements are: a main control to move and rotate the spine around, independent motion for the hips and chest so you can move them without affecting the rest of the rig – for instance, when you want the model sat with its back legs on the floor, but with its front legs standing – and the middle of the spine. The spine needs to give a good line of action, so the hips and chest must be connected in a curve that displays arcs, so we'll need a control to tweak the middle of that curve.

For the deformation rig we need a strechy spine with no flipping issue that allows us to have a smooth skin. Finally, we'll use other deformation techniques to enhance areas such as the belly.

The setup of this tutorial can be applied to create insects and other non-quadruped animals and creatures too, as they share lots of similarities, but using more than four legs or combining arms and legs.

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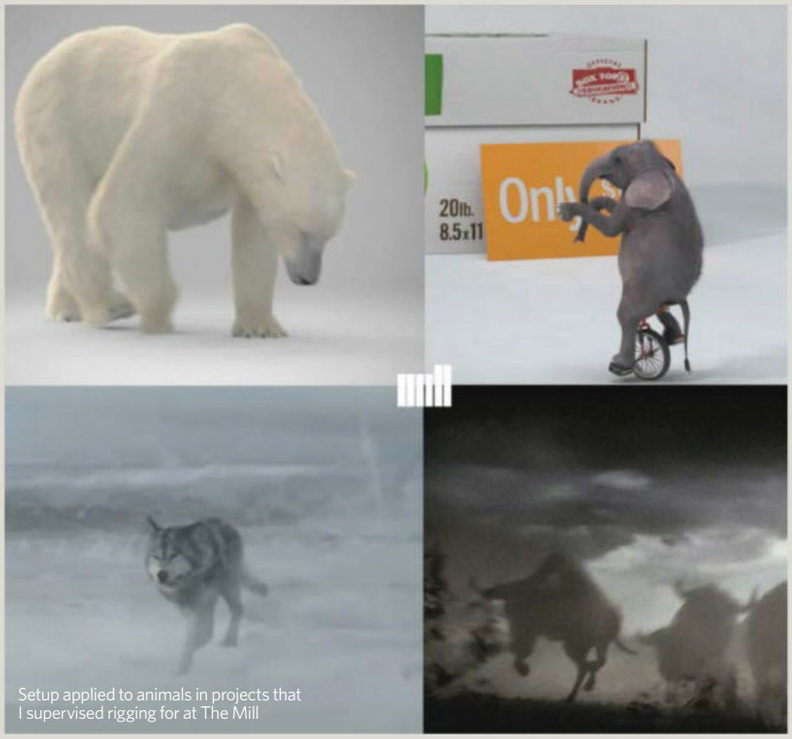
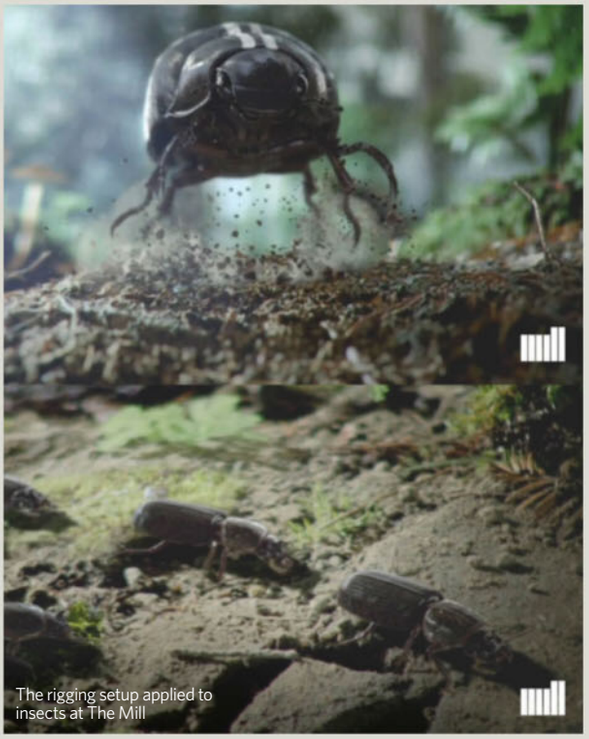


Setup applied to animals in projects that I supervised rigging for at The Mill



The rigging setup applied to insects at The Mill

Bust a move...

01 Base hierarchy

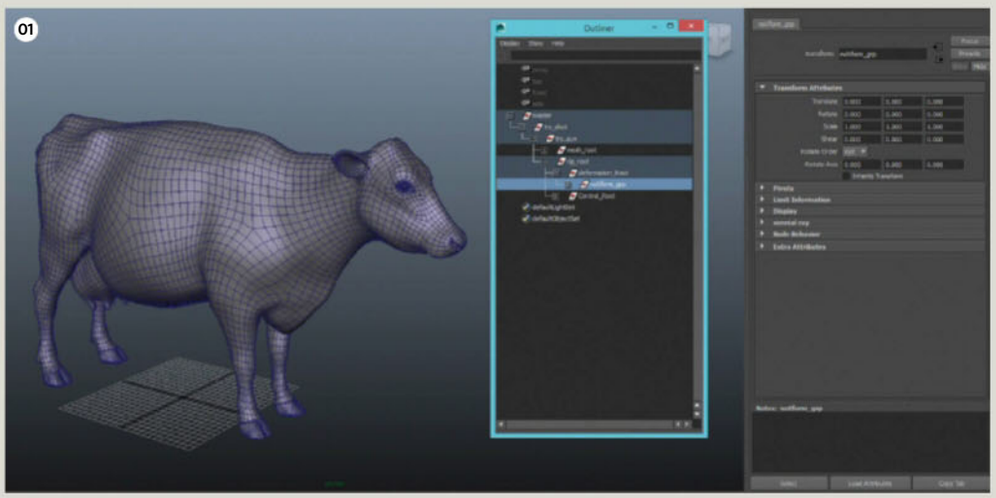
It is always good to have the full rig under one Transform, which I normally name 'master'. Under this, we should have a mesh_root for the geometry that we need to deform, and a rig_root. The rig_root needs two children – control_root and a Deformation root for the separated rig hierarchies. Under the Deformation root, create a noXform group, with the Inherit Transform section unchecked. This becomes the parent of an object that can then double transform.

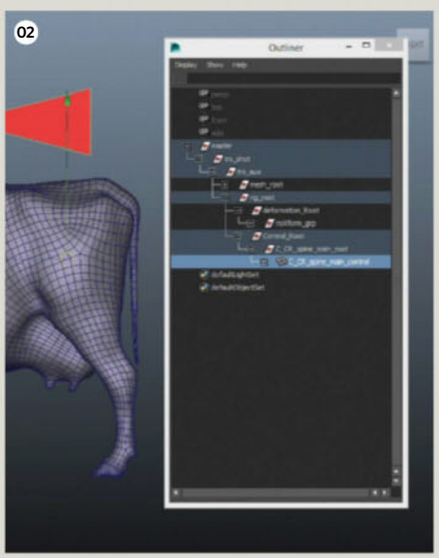
02 Place the master

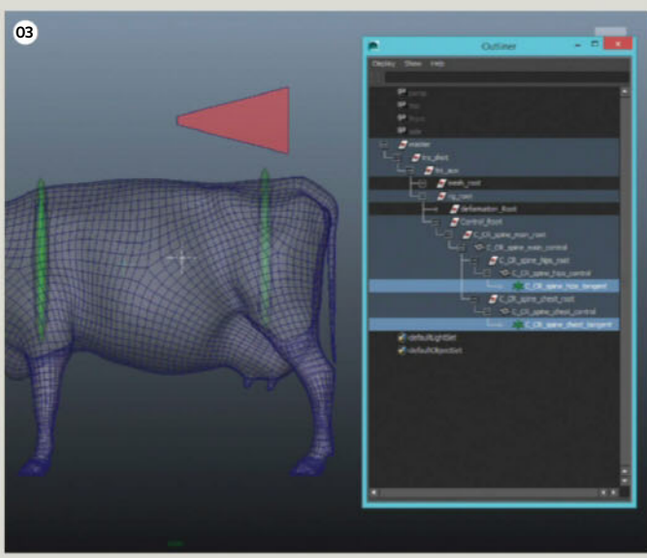
The placement of the main control is really important when you're rigging. Most quadruped rigs would place it in the middle of the spine, but the ideal place is the hips. Think about how a child would play with a toy horse – they'd grab and move them from the hips. Movement always starts directly from the hips and then spreads out to the rest of the character.

03 Chest and hips control

The chest and hips control must be placed in a good position to achieve the necessary range of motion and to drive proper deformations. Make the two controls children of the main control. We then need to create a Locator parented under both these new controls. Name these Locators 'Tangent'. We need them to define the position and rotation of the middle control.







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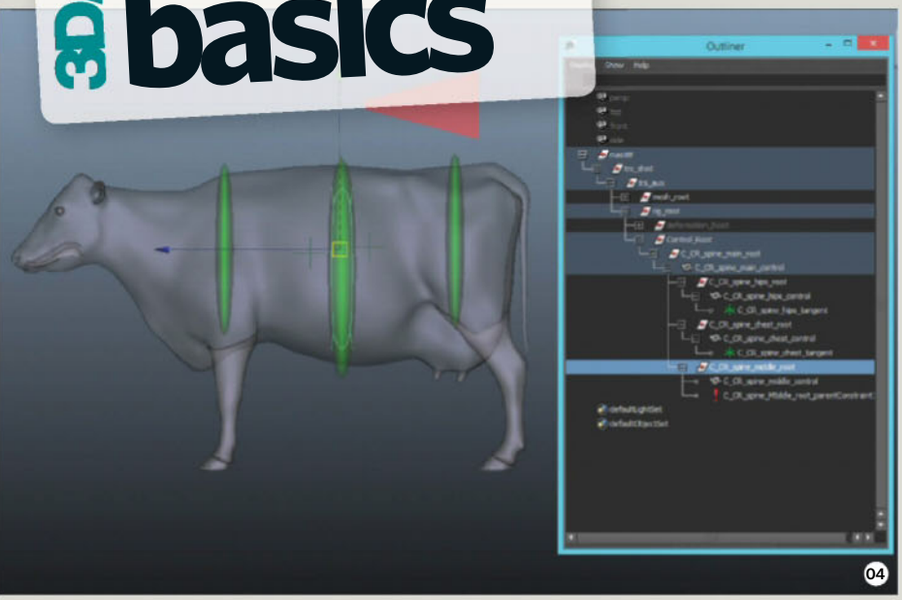


04

04 Middle control

We now need to make the middle control a child of the main control. Make a group for the control and then parent-constrain it to the Tangent Locator of the hips and chest that we just created. This gives us a much nicer interpolation for the middle control when we rotate the hips or chest.

05 Start the deformation rig

Create two bind joints that are parent-constrained to the chest and hips control, ensuring that they have no offset on the constraints. Remember than for now, all the objects are under the deformation_root. Then create three groups that are parent-constrained to the chest, hips and middle control with no offset.

06 Make a spine curve

Now we need to create a curve with two degrees, and three Locators parented under the three groups that we created in the previous step. For each Locator, select the shape connecting the World Position to one control point of the Shape node of the curve. This is an easier way of deforming the curve, rather than using Cluster or Skinning. The Locators don't need to be in the same position as their parent group, and you can offset them in order to give them a better position on the spine. Don't forget to parent the curve under noXform to avoid double transformations.

07 Add Locators

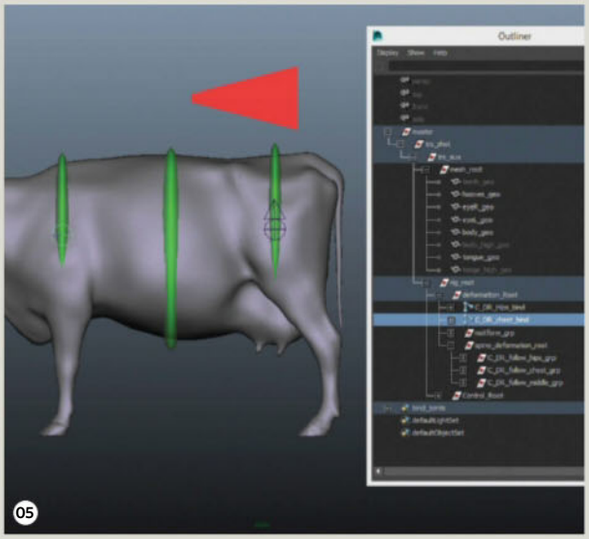
Create eight Locators and connect them with the curve with a motion path. I do recommend creating the motion on a Path node by command. For each motion path, connect the curve shape's World Space with the motion path's geometryPath, and later the motionPath AllCoordinates with the Translate Locator. This is a much lighter way to create a motion path and it doesn't require you to depend on loops like the one in the Animation menu. Set the U value for each motion path so that all the Locators are evenly spread along the curve. Like the last step, remember to parent the Locators under the curve in the noXform group to avoid double transformations.

08 Joint on the curve

We now need to create eight joints, seven of which are for doing the bind, with one for the end of the chain. Create seven DistanceBetween nodes and connect each of the DistanceBetween nodes with two Locator shapes so we can measure the distance between two Locators. Point-constrain the first joint to the first Locator. For each joint after the first one, connect Translate Z to a DistanceBetween node. This makes the joints the right length. Once we have them all connected, we can break the Translate X connection on the joints so we don't have dependencies later.

Clean Transform on the controls

Having a clean Transform for the main control is incredibly important. It is better to use a group as a parent for this purpose and avoid using Maya's Freeze Transformations. We need a clean Transform in order to return to the default state of the rig. Going back to the default state is always needed when it comes to adding new elements to the rig or rebinding it. Testing the rig as we create it is good practice too. Ultimately, having the ability to go back to the default state is always a must.



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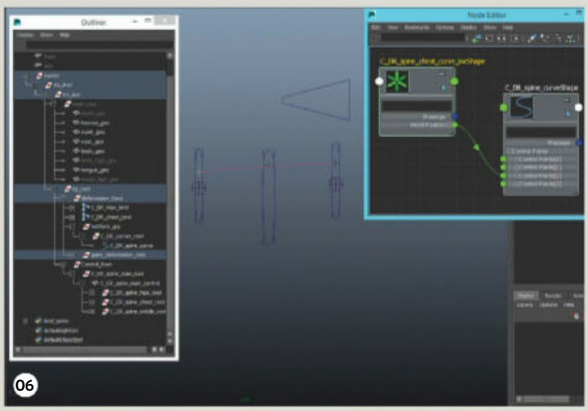

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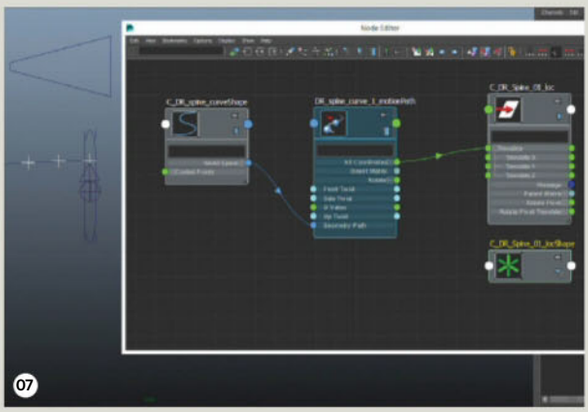

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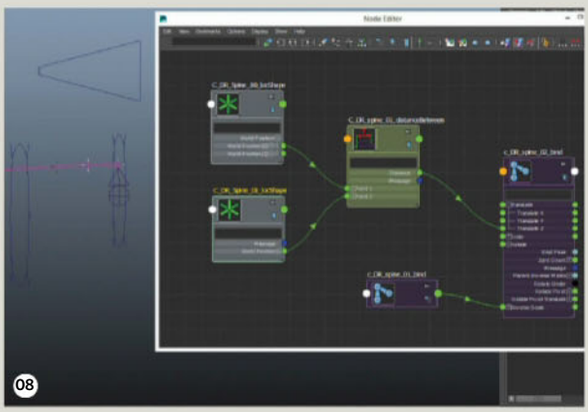

08

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09 Aims and upObjects

Each joint aims to the next Locator in Z and upVector in Y. To resolve the twisting, we need to create a curve that is offset from the first curve. To do so, repeat what we did in step six, but offset the three main Locators. Then create seven new locators attached to the new curve, repeating step seven. Each aim must have the World Up type in Object Rotation Up, and the World Up object must be these new Locators.

10 Stretch joints

For us to make the spine able to stretch, we need to be able to scale the joint in Z when the curve gets shorter or longer. To do so, create a MultiplyDivide node for each joint. Set the Operation mode to Divide, then connect the DistanceBetween to input 1 and the next joint position Z to input 2. The last thing to do is to connect the Output X to the Joint Scale Z.

11 Control the master motion and skin

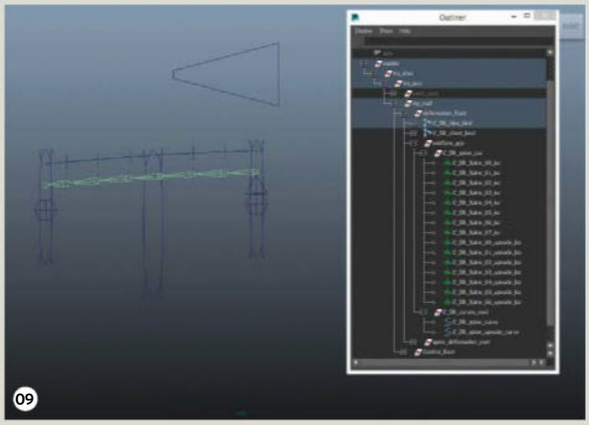
After a skinning the spine and the rest of the deformation rig for the quadruped, we can test the master control motion and rotation. This should prove why it was so important for the pivot point to be in the hips and not in the centre of the spine.

12 Move the front and back

Move and rotate the chest and hips control. This demonstrates how we've achieved independent motion in both controls. It also proves that animators can modify this area without affecting the other ones.

13 Control the middle

Thanks to the Tangent in the chest and hips control, we have a nice curve in between both controls. The middle control interpolates nicely in between the chest and hips, and animators can use the middle control to tweak that curve further.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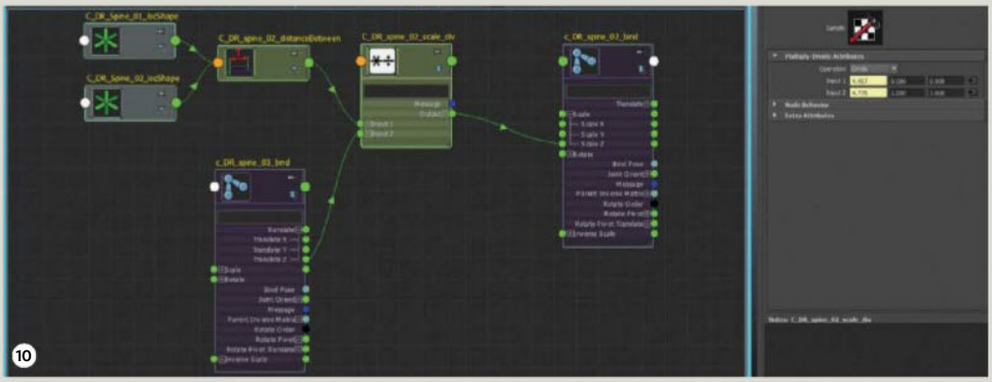
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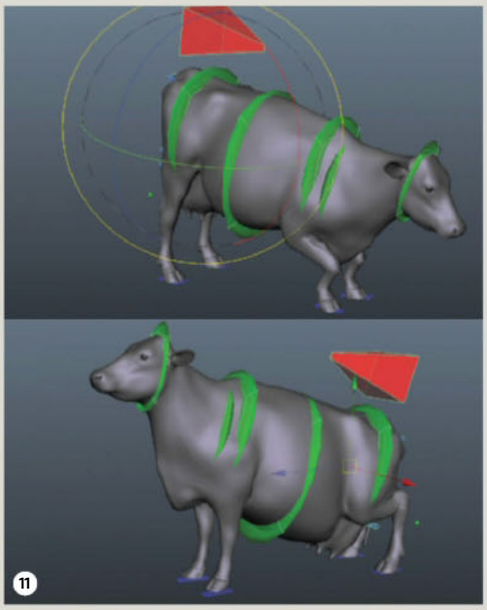
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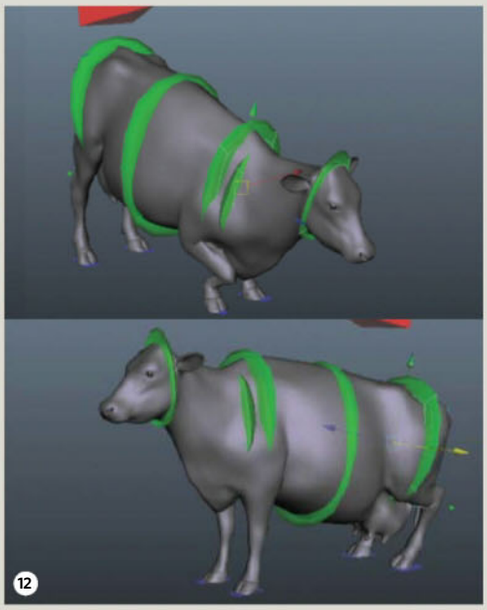
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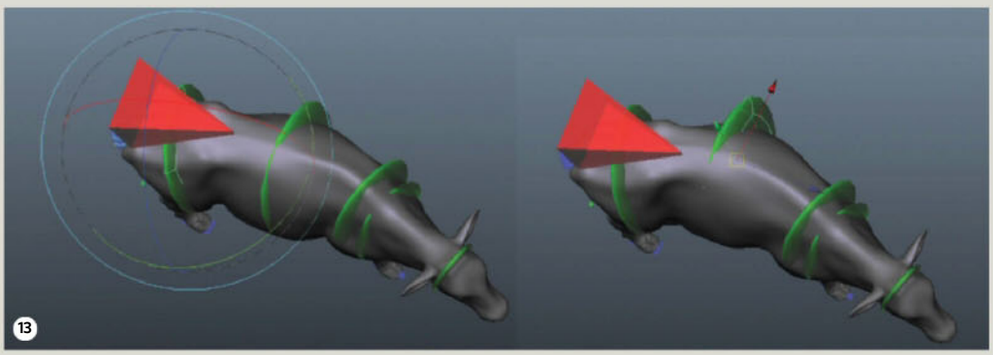
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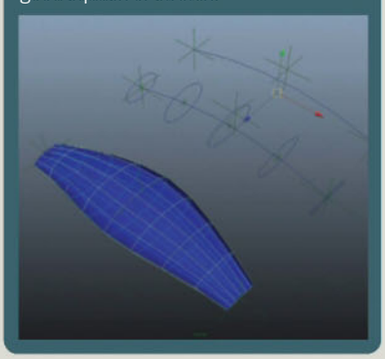
Geometry deformation muscles

For belly areas or other complicated areas, we can do our own muscle mesh. We can use a curve controlled by Locators, then on top of the motion path curve, we can attach NURBS circles. Finally, we can loft these circles. Be sure that in the Lofts option we set Output Geometry as Polygons, Type Of Tessellation as Quads and Format to General. Use the geometry to deform in skinning. In order to do so, we need the Skin node to be in Classic Linear, enabling Components. The benefit of this is that we can paint the muscles in one go, so it's much easier to handle than lots of joints. We can even modify the circle's profile so that it results in a good squash or stretch.



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Masterclass

Rainer Duda, 3D graphics expert and former Houdini TD, shares his knowledge of Houdini's particle and fluid behaviour

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Even if the Collision geometry isn't made up of interesting shapes, the Turbulence Generator ensures unique simulations

Simulate turbulent water

"How can I build a Turbulence Generator in order to create various fluid simulations in Houdini?"

Impressive fluid simulations don't necessarily need a huge number of particles in the project to look realistic. All you really need is a complex nexus that is made up of a reasonable number of particles, including specific attributes that can be easily accessed in the UI.

These attributes drive the turbulence of the whole simulation flow, but they can be used for any kind of fluid simulation. This is particularly useful, even if the Collision geometry doesn't have very interesting shapes. This tutorial will explain one way that you can create a sustainable Turbulence Generator that can be used in combination with the new POP Solver or with plain particles for spray and random sprinkled water effects.

At first we'll cover how to set up particle emitters with properly set Normal directions. After that, we'll then create a Turbulence Generator with a VOP SOP (Vertex Operator Surface Operator) node. This VOP SOP node enables us to modify each parameter in exactly the same way as the objects and their deformations. If you look at the Geometry node inside the Network Editor pane, by using VOP SOP we can move onto the base of our simulation in order to work on the fundamental sections, such as the vertices and their attributes.

The heart of the VOP SOP will be an Anti Aliased Flow Noise node wrapped into a special setup. This Anti Aliased Flow Noise node is the driving force when it comes to modifying the Normals output. It offers more parameters than the ordinary Anti Aliased Noise, such as the position in its flowspace, flow rate as well as advection.

The setup around that node will contain a Ramp parameter, which allows for the modification of the Normal length to correspond to the values set in the Ramp UI. Once the Turbulence Generator is in place, we'll link it to a Particle Operator Network node in the Dynamic Operator network where our Flip Fluid base is located. The Flip Fluid base will be prepared beforehand and the Turbulence Generator will affect the particle velocity instead of micro solvers.

Last but not least, it's time to prepare the Collision geometry – or more precisely, the reservoir dam – that will be used as Collision geometry by adding a reference to a Collision node. At this point you'll understand how to set up fluid simulations, how to let them interact with geometry and how to create digital assets.

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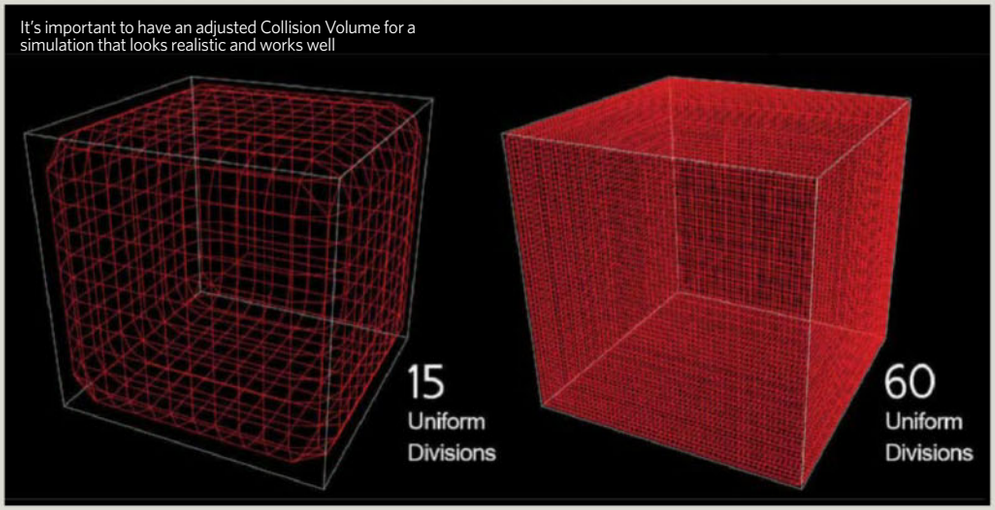
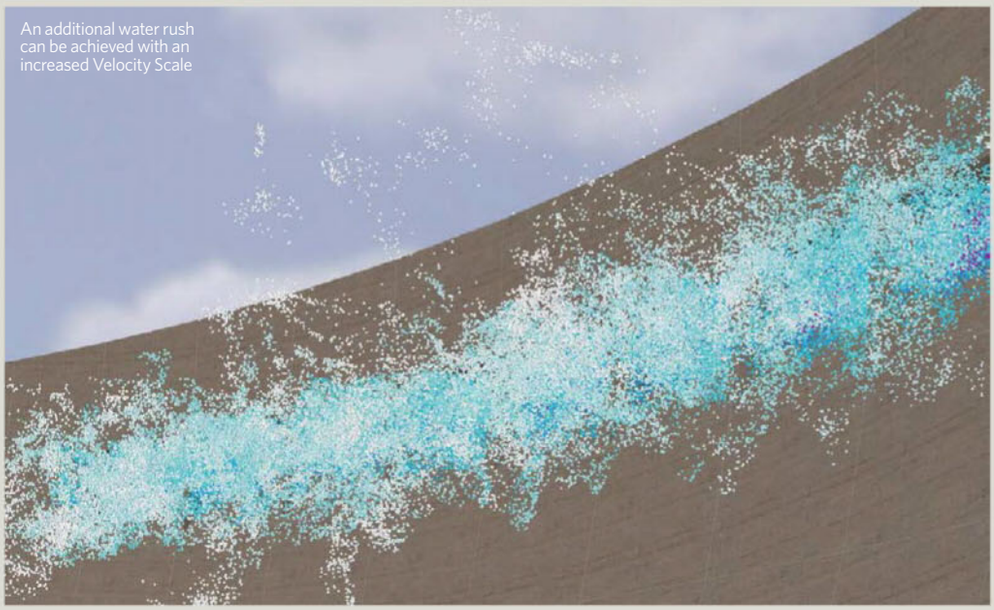


It's important to have an adjusted Collision Volume for a simulation that looks realistic and works well



An additional water rush can be achieved with an increased Velocity Scale

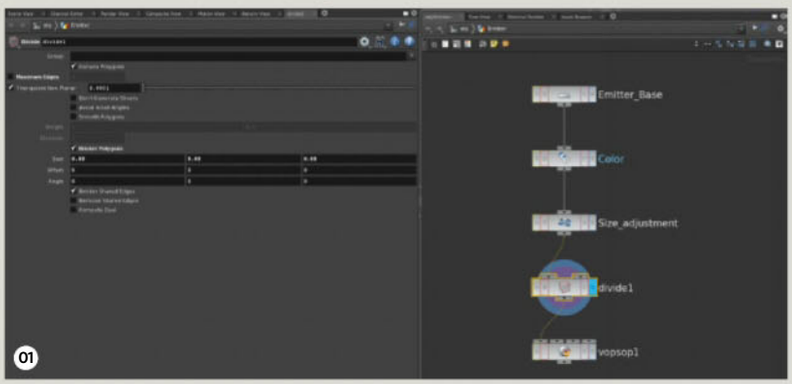
Discover how the Turbulence Generator uses the Velocity attribute to drive particle directions

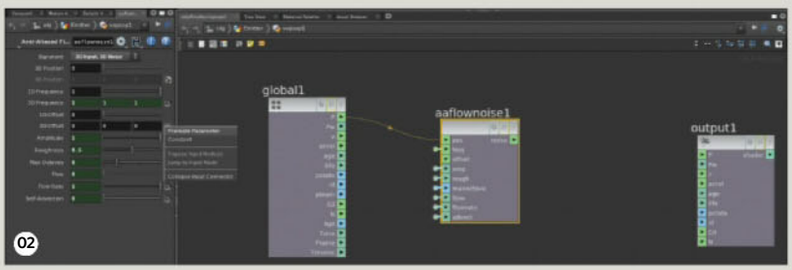
01 Add subdivisions to the emitter

Before we start with the actual Generator, load the file FF_Startup.hip. The scene already includes geometry for the emitters. Let's dive into the Emitter Geometry node. Append a Divide SOP from the Tool menu and remove the flag at the Maximum Edges function. Afterwards, activate the Bricker Polygons function to subdivide the poly grids. A good Float Value here is 0.08. If you lower the number you can increase the subdivisions even more. For visual testing keep the value as mentioned. The next step will be to create a VOP SOP node and connect it to the Divide node.

02 Prepare the flow noise

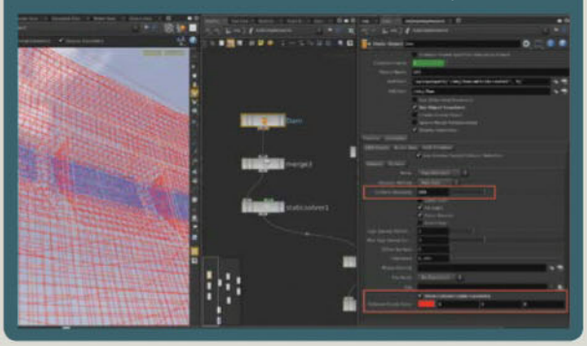
After the VOP SOP node is in place, double-click it and jump to its core, known as the VOP Network. It's now time to add the Anti Aliased Flow Noise node via the Tool menu. We must connect the input named Pos with the P output of the Global Parameter node. Basically we're feeding the Anti Aliased Flow node with the Point Vector information of our source emitter. As we work with vector information – which means three dimensions – it's necessary to switch the signature of the Flow Noise node to 3D Input, 3D Noise. All other parameters must be promoted with a left mouse click on the right-hand sided gear.





Collision geometry for fluid simulations

It's quite easy to convert geometries to Collision objects. All you have to do is select the specific geometry and apply the Static Object function in the Rigid Bodies shelf tab. Houdini will immediately create a setup to import the geometry into the DOP Context. In there it will be used as a Static object, including a Static solver, which is connected to the Flip Fluid branch. What's really important is the setup of the actual Collision geometry. If the resolution is too low, select the Static Object node in the DOP's Context and increase the Uniform Divisions parameter.



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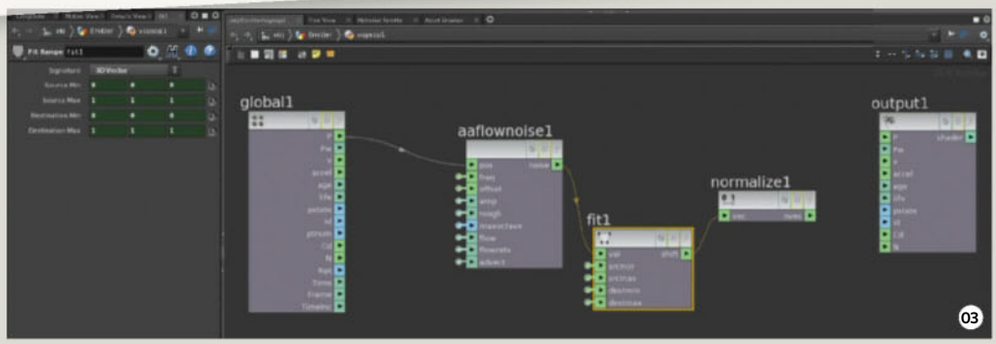
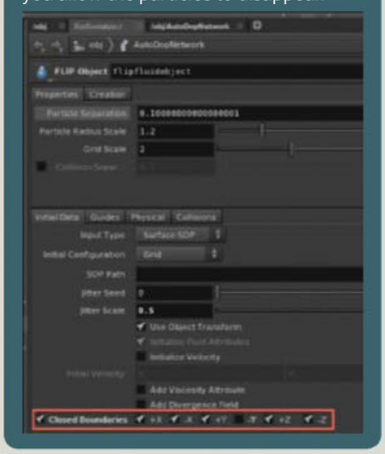


Close Boundaries for optimal results

When you work with Flip Fluid simulations then it's always wise to work with Closed Boundaries. You'll find this function at the Flip Fluid Object node within the DOP Context. This basically enables you to adjust the fluid container as you wish, so it could have fixed sizes for specific areas. If the fluid hits the boundaries of the container, our settings define the reaction. Either you let the simulation act like in a flip tank so that the fluid stays in the container, or you allow the particles to disappear.

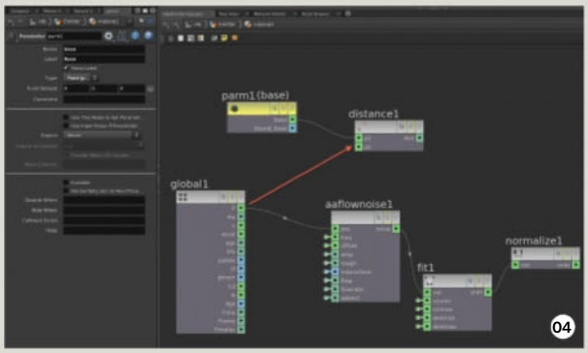


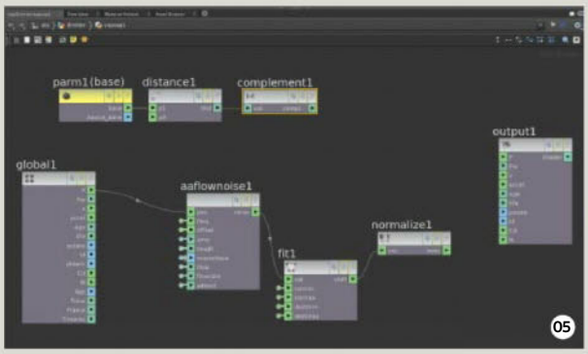
03 Direct the flow noise

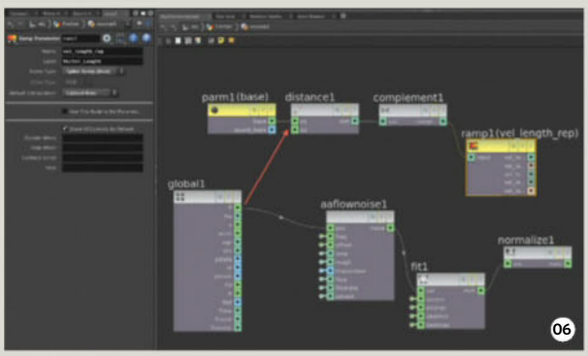
It wouldn't work well if we connected the Flow Noise output directly to the Normal slot of the Global's Output node. The noise would move the Normals in all directions – even to the back, though there's an easy way to avoid this. First, add a Fit Range VEX node from the Tool menu. Now connect the Vector Input of the Fit Range node with the Flow Noise Vector Output. This node basically takes a Vector Input and clamps the values from to the actual source range to the destination range. After this we'll need to add a Normalize VEX node to the Output of the Fit Range VEX node.

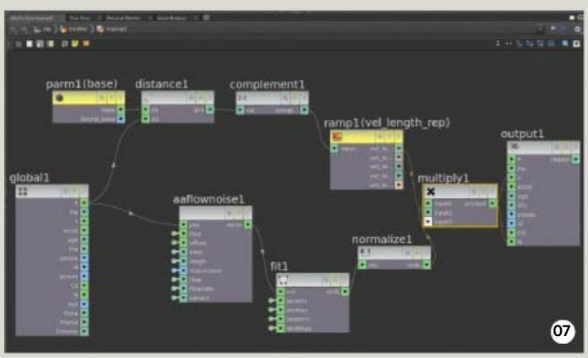
04 Control the vector length

At this stage we can already see how the normal vectors are driven by the Anti Aliased Flow Noise, but all with the same vector length. Usually the length of a Velocity vector will be used in the POP – now integrated in DOP – context as a Speed Indicator. The base for the new setup will be a Parameter VEX node. Change the Type to Point because we'll want it as a target for the longest vector later on. To measure the distance from all Emitter Points to the new Point, simply create a Distance VEX node and connect the Point's position from the Globals and the Point Output to its inputs.









05 Invert vector lengths

By now, the result shows shorter vector lengths the closer the Emitter Points get to the newly created point located at the origin. The easiest solution to invert the appearance is to add a complementary VEX node and plug it into the Distance Output. Every value will be subtracted by the value of 1. Stick to the default Float. It's now arranged so that the tallest vectors are basically the vectors that are the closest to the point at the origin. To control the vector lengths, it's necessary to add a Ramp Parameter VEX node as the next step.

06 Control vector lengths

The VEX network needs one more control structure to modify the vector lengths, with a visual representation in a range integrated in some kind of UI. What we need now is a Ramp parameter from the toolbar. It must be connected to the Complement node's output. We're working with float information, so it's recommended that we set the Ramp Type to a Spline Ramp with Float values and a Catmull-Rom spline as the Default Interpolation. Last but not least, let's give the Ramp parameter a reasonable label and name description like 'vel_length_rep'. The Ramp UI is now available on the VOP SOP node one level above – outside of the VEX network.

07 Combine vector lengths with noise

The last step in the VEX network is the combination of the Anti Aliased Flow Noise setup with the Ramp Parameter branch. The target is to apply the noise to the different vector lengths, which can be adjusted in the ramp. Our solution for the target is to add a Multiply VEX node from the Tool menu. Slot 1 needs to be connected to the Output of the Normalize VEX node, while Slot 2 takes the output of the Ramp parameter. To finalise our work, connect the Multiply output to the Global's N and V Output – N to apply the noise to the point Normals, while the Velocity attribute will be used in the new POP paradigm within the DOP network.

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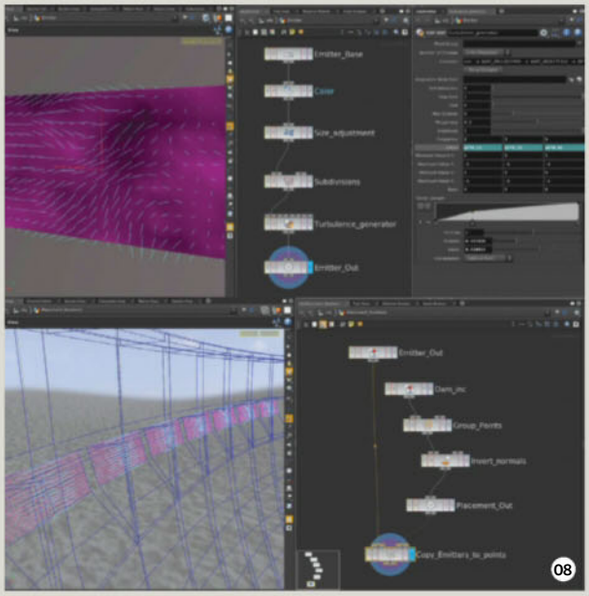
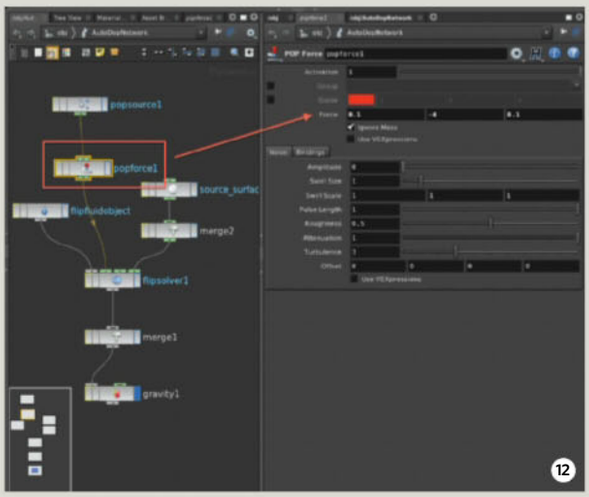
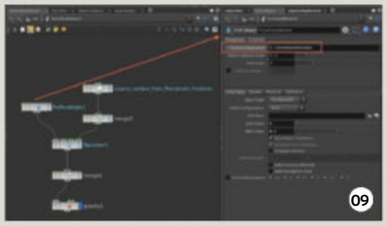
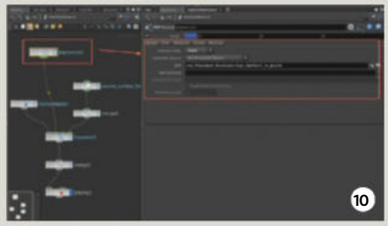
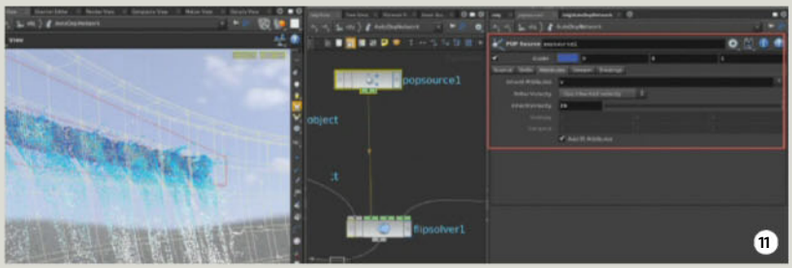










08 Place final emitters

The VEX work is done so far and now we need to append a Null node to the VOP SOP node with the name Emitter_Out. At the OBJ level in the Network Editor pane you'll find a premade Geo node that is called Placement Positions. This all depends on the placement and final positions next to the Dam geometry where the waterflow will happen. What's left is to jump into this node and scatter or copy the Emitter_Out node onto these points. To do that, simply add a Copy SOP node from the Tool menu. The first input will have to be the Emitter_Out geo via an Object Merge node and the second input will have to be connected to Placement_Out.

09 Integrate Flip Fluids

After all the emitters are in place, hide the initial geometry by deactivating the blue flag on the Emitter node. Now select the Placement Position's Geo node and click the Emit Particles function in the Particle Fluids shelf tab. After this, Houdini will want to know to which fluid it should use as a source. As we don't have one, just press Enter and it will create a new one including a DOP – Dynamics Operator Network. If you hit the Play button the simulation starts. Handy parameters are located in the Auto DOP network at the Flip Fluid Object node. A decreased particle separation will be used to create impressive simulations by ensuring that there are shorter distances between particles.

10 Edit the particle velocity

A Flip Solver contains an embedded POP Solver, which lets us use the previously created Turbulence Generator to update Velocity attributes. The bottleneck at this stage is that only POP nodes can be used to change the particle velocity, which updates attributes like V, Targetv or Force. That is the reason why we've added a V Output in the VEX network instead of simply an N. Just as a side note: N can still be used in the old POP networks. However, let's dive into the Auto DOP network. We must now add a POP Source node, which is quite similar to the one in the old POP system. Under the Attributes tab in the Inherit Attributes line, enter V.

11 Finalise the particle velocity setup

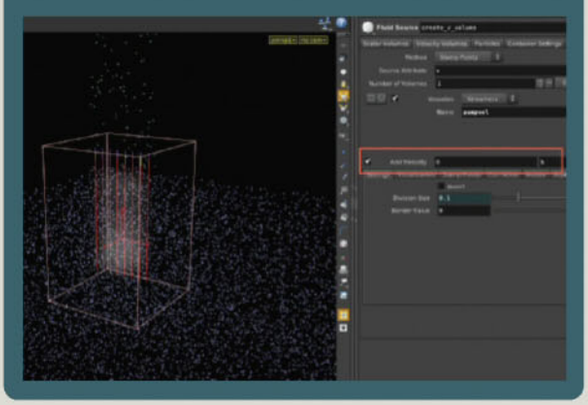
Until now, we told the POP Source node that we want to inherit V, the particle velocity, from our source. It's time to add our source. At first we must go to the Source tab and change the Emission Type to Points, and under Geometry Source select the function Use Parameter Values. Under the SOP line, choose the Copy Emitters To Points node. The next tab is called Birth. Over there, change the Impulse Count to 1500. Each time the node cooks, 1.5K particles will be created. The Life Expectancy must be 5 with the Life Variance set to 0.6. Now set the Jitter Birth Time to None and type Newborn into the field Just Born Group.

12 Adjust velocity and force

Our last adjustment starts in the Attribute tab in the POP Source node. Under Initial Velocity, set the Method to Use Inherited Velocity. At the same time, increase the Inherit Velocity value to 25. One more node is necessary to finish this setup. Create a new node called POP Force from the Tool menu and append it to the POP Source node. In this node we're basically changing the Force parameter so that they fit our needs. Use a negative value of -4 for the Y direction. X and Z-axis can have a small value like 0.1. The last step is to connect the POP Force with the Particle Velocity input of the Fluid Solver.

Control velocities via pumps

There is another method available how you can drive fluids besides a self-made turbulence generator. In the shelf tools under the Populate Containers tab you'll find a function called Pumps from Objects. Note that it's important that you work with a volume based fluid. If so then you can give fluids velocity information as soon as the fluid touches the pump. This is really handy if you want to create spray-like effects or an open fire hose. Just activate the Uniform Velocity at the Source Volume node.



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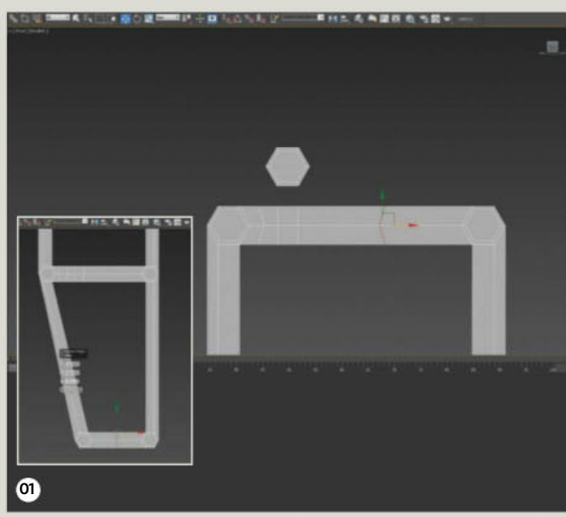
Sci-fi tips in 3ds Max

"What are the most important techniques to keep in mind when designing sci-fi in the 3D realm?"

Creating sci-fi imagery in 3D is never easy and requires a lot of patience, although knowing certain techniques can definitely help speed up the workflow. While each artwork is always unique, hard-surface modelling as a category has many similarities that are repeated, no matter whether we're modelling a rifle, a tank, a spaceship or a sci-fi interior. Patterns, holes, hard edges and the like will always be present in all of these kinds of art.

Over the course of this tutorial we'll go over some of the basic bread-and-butter tools and main ideas utilised when doing this sort of hard-surface work. The main idea is to repeat these things almost procedurally, going from profile views to 3D, remembering to use patterns and holes to create interesting surface details.

Last of all, keeping the topology clean can be time-consuming at first, but it can be an absolute blessing when we start to play with the FFD modifier, which allows for crazy experiments, giving us what's commonly known as 'happy accidents' that create interesting shapes that we can keep and use in our project.



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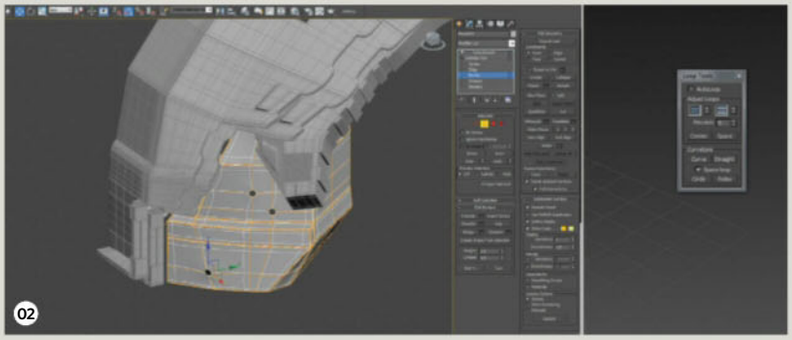
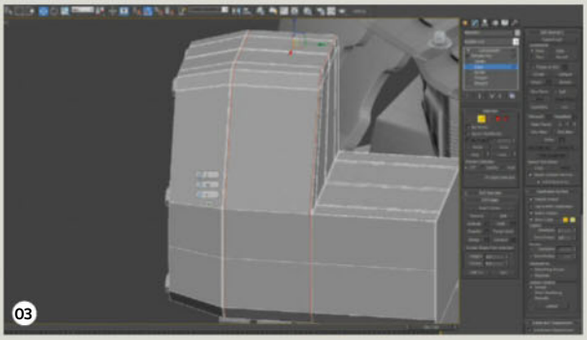
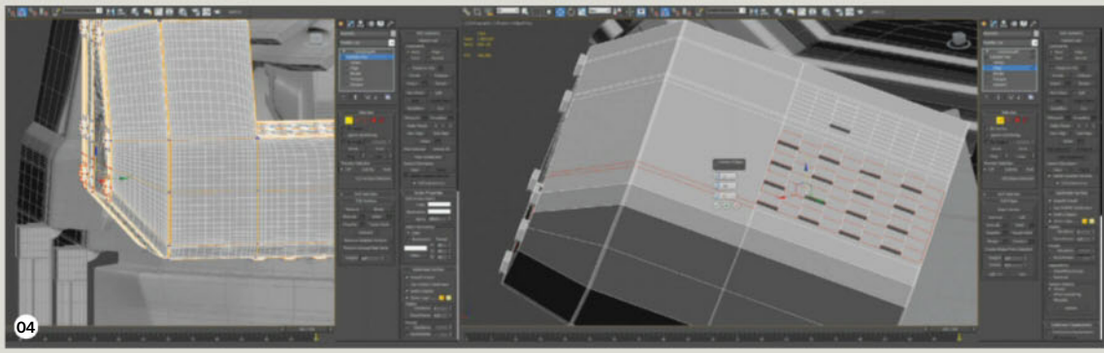




01 Think in profile view

This is a general rule that applies to anything, whether it's something sci-fi or not. Working in profile, side or top-down view is great to establish the overall proportion, scale and idea of the piece we are creating. This approach can be utilised to create either small props like the neck areas that I'm doing here, or something massive like the outer shape of a vehicle. Work in profile views, connect the different parts and then extrude out and/or shell it.



02 Add holes

Holes, or cut-lines, are part of almost any sci-fi creation. They can be achieved in a number of different ways, but one method that I like is using the Loop tools from the Graphite Modeling, as well as the Circle function. Simply delete the faces, Shift+drag the selection while holding the R key and then run the Circle tool.

03 Make hard edges

The bread and butter of hard-surface modelling in 3ds Max is the Connect tool. Using it in the right places and using the slide to make it just at the right distance will control the tension of your surface, enabling you to create tight-looking planes. There's nothing less appealing than a wobbly plane or some uneven surface that hasn't been smoothed out in the right way. In this case, it's almost like real life – it's the difference when you see a nice piece of crafted metal and one that has lumps and bumps around the edges. It sounds obvious, but there is a level of subtlety that experienced hard-surface modellers reach and that makes the difference between a high-quality modeller and one that is trying to reach that level. Be smart where you use your connects!

04 Work with patterns

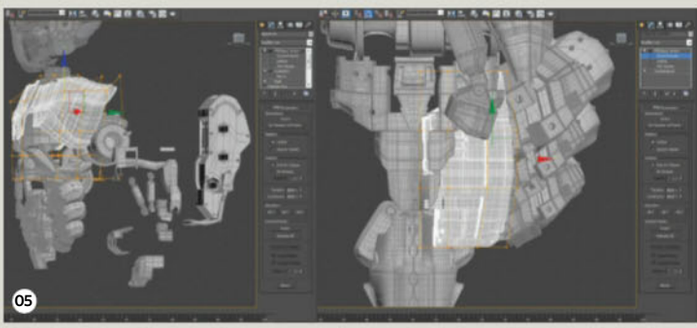
Patterns and repeating shapes are one of the main features in hard-surface sci-fi design. Looking at the correct reference and right inspiration of where to place them is fundamental to make the design look smooth. Once again, after we punch the holes, we need to ring-connect all of them in order to maintain their straight position. Once the shape has been created, if we need to arrange it in a slightly different fashion later on, we can either control the vertices or use the FFD Box modifier.

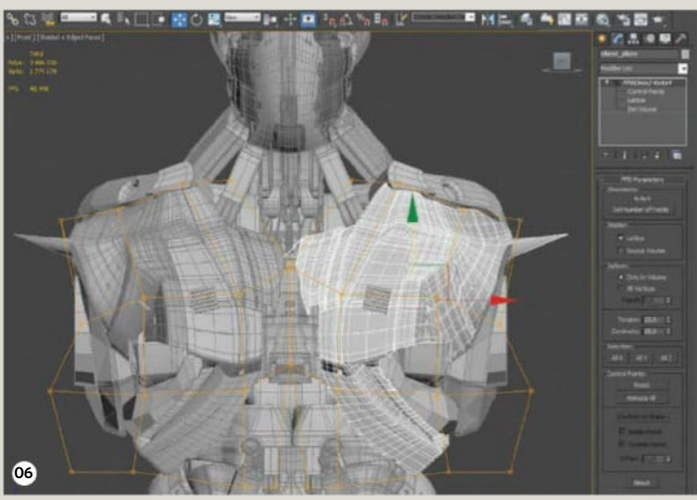
05 Use quad topology

Perhaps my favourite modifier in 3ds Max together with the Shell one, the FFD Box allows for meshes that have been created with quad topology to be 'shaped' around in such a nice fashion. It allows us to manipulate a chest piece or a helmet – or an abdomen piece as shown here – with extreme ease. A combination of Bend, FFD Box and Symmetry is absolutely essential for hard-surface matters.

06 Push the FFD modifier

Experimenting with the FFD Box in combination with the Symmetry is a great way to fix issues with a symmetrical design and/or explore slightly different variations that we did not originally come up with in the first place. I often find myself modifying the FFD Box and Symmetry modifiers a lot around the end of the design in order to get unexpected results that I might want to keep, or perhaps to get ideas for the next step. This process is usually referred to as 'happy accidents' – it consists of creating shapes or patterns that are unexpected, but that match what we're working on, or can be slightly tweaked to match it. It is one of my favorite workflows and one of the main reasons why even if it's slower, modelling with Quad topology can be effective later on down the line.





3D sci-fi tips for designers

The best combination to reach a really good, realistic-looking result is a decent mix of strong hard-surface foundations that need to be repeated over and over, alongside the freedom to explore and experiment thanks to the tools and modifiers provided by 3ds Max. It's these tools that allow the designer to come up with unexpected results.

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Technique focus

Incredible 3D artists take us behind their artwork

MODELLING To create the lizard's skin, I modelled a few low-poly scales, then laid them on the body with the Insert Mesh brush. I projected the detail onto a new mesh. This method gave me a lot of control over the placement of each scale, the main disadvantage being that it's time-consuming and can sometimes create a rather mechanical-looking result. **Lizardman,** 2014

Omar Jason

Website www.cargocollective.com/omarjason

Country UK

Software used ZBrush, Photoshop

Bio A self-taught 3D artist with a background in architecture, Omar moved to London to work in VFX

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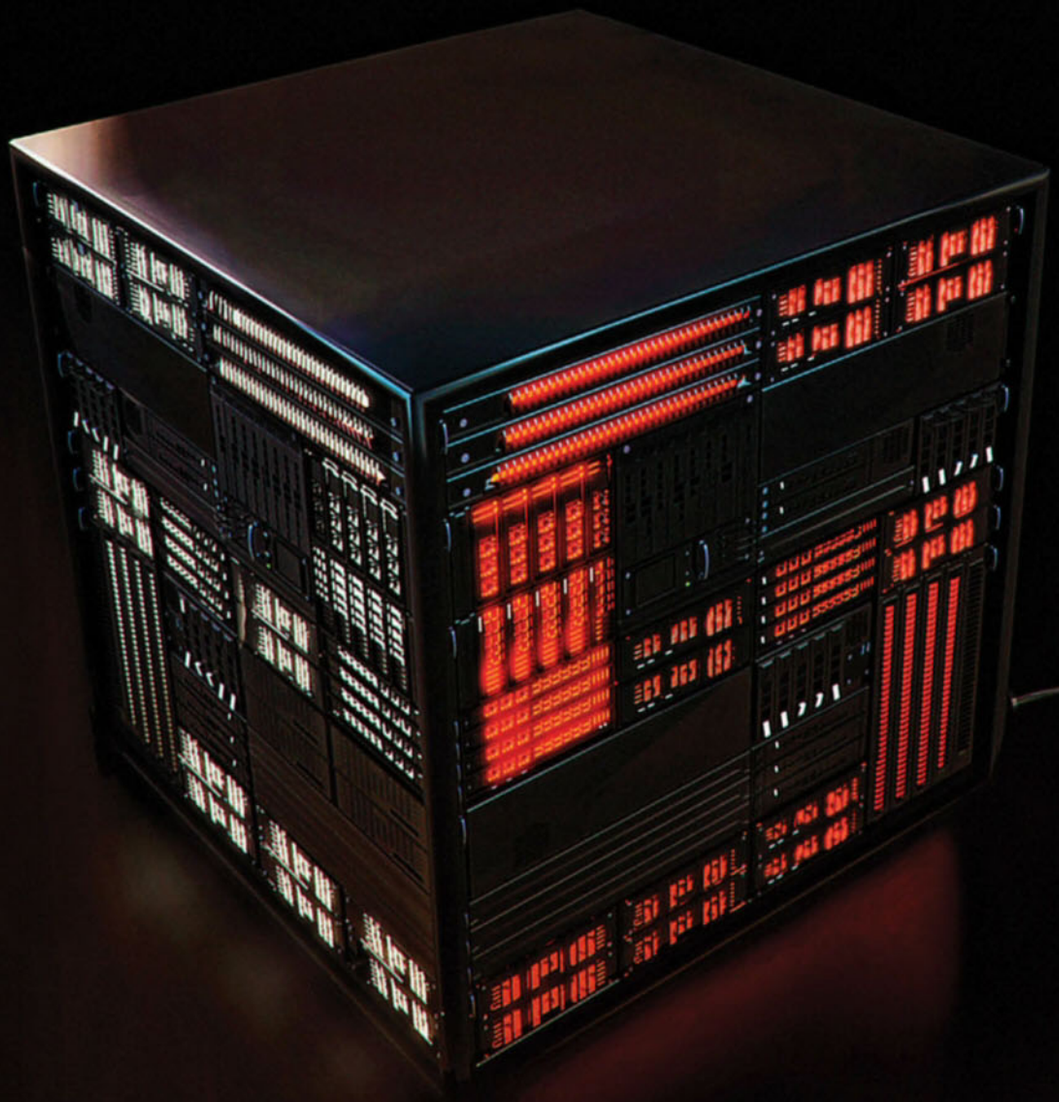

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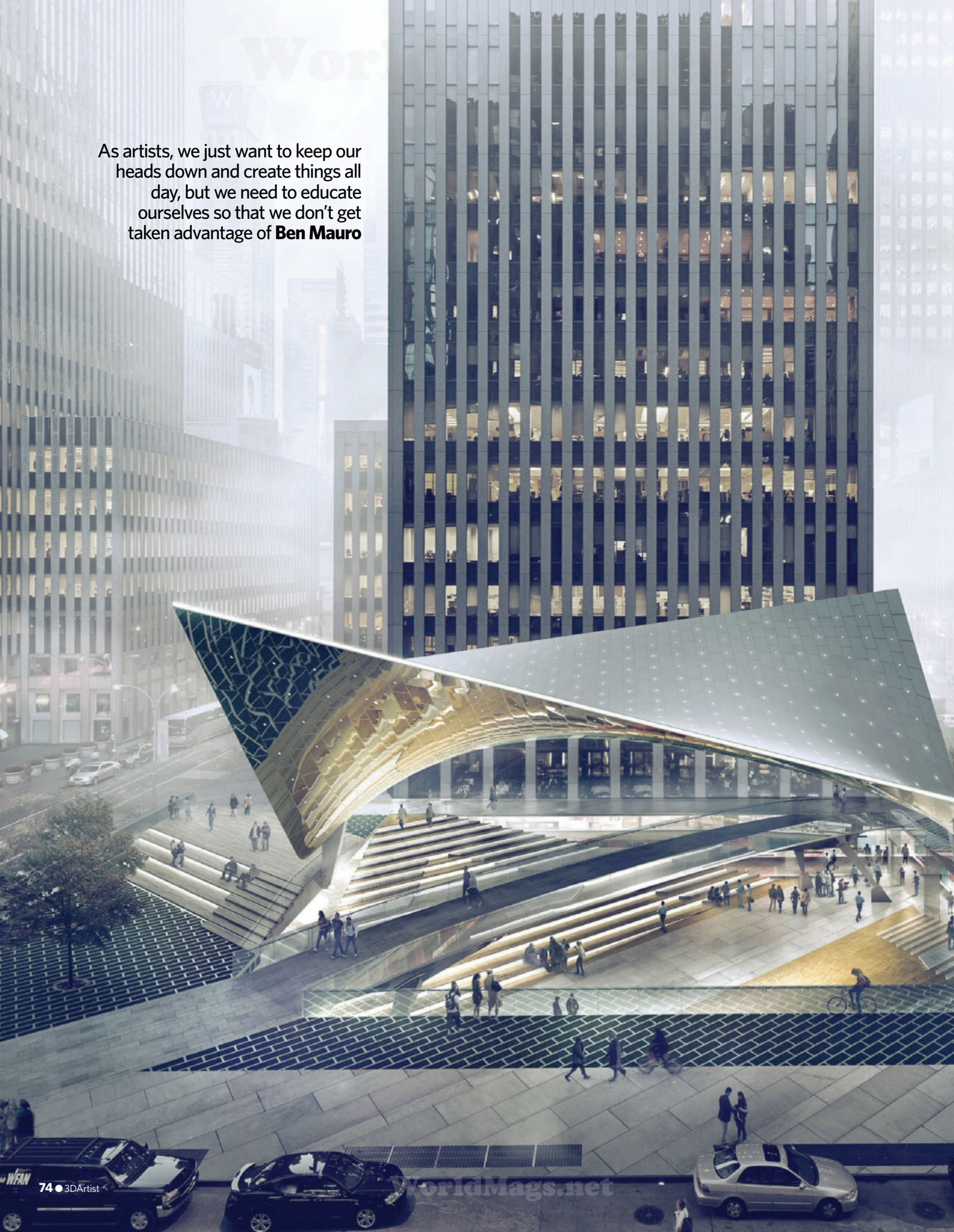

As artists, we just want to keep our heads down and create things all day, but we need to educate ourselves so that we don't get taken advantage of **Ben Mauro**

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EARN MORE FOR YOUR 3D

MULTIPLY YOUR EARNINGS FROM YOUR 3D WORK WITH THIS PROFESSIONAL GUIDE TO SUCCESS

Over the past year, design heavyweight Ben Mauro has officially made the transition into working as a freelance designer full-time – a decision that has changed his life. "Embracing this mentality fully, I sold most of my belongings and have been travelling the world while I work out of my laptop," he reveals to **3D Artist**. "[I'm] making up for lost time stuck at a desk in one place for too many years."

After experiences creating his designs for everything from *The Hobbit* trilogy and *LUCY* to real-robotics design with Boston Dynamics, he's had a career – and a year – that most 3D artists would die for.

These days, however, it's harder than ever to get there. A 3D artist needs to be able to work in a team as well as be excellent on their own, decide whether to be a generalist or specialise and stand out from a whole new level of competition as more and more talented students graduate from the best schools. This is alongside a need to constantly update a website, showreel or be active online to keep publicising themselves and their work. All this, while working all over the world in an industry now operating on an international scale. "Persistence would be a big part of it. I don't feel like I was particularly talented when I started down the path of being an artist – up until now most of my energy has been [spent] catching up to everyone else that has been doing this longer," Mauro explains.

Aside from the quality of your work and the perseverance with which you do it, though, there is also a third crucial aspect to success: being a good entrepreneur. "I think the business side of the industry is hugely important, especially when you start branching out and being independent," Mauro affirms. "Knowing what your work and time is worth, the things you are entitled to when working on an job or a new business venture, or how you should negotiate something are all important things to understand as an artist working in this industry."

Whether you're new to the industry, going freelance from home, or even thinking of setting up your own company, we've teamed up with some of the most talented artists working today to reveal how to stand out from the crowd, find clients, understand contracts, set rates and, of course, make more money!

Gensler NY morning mist by Mats Andersen

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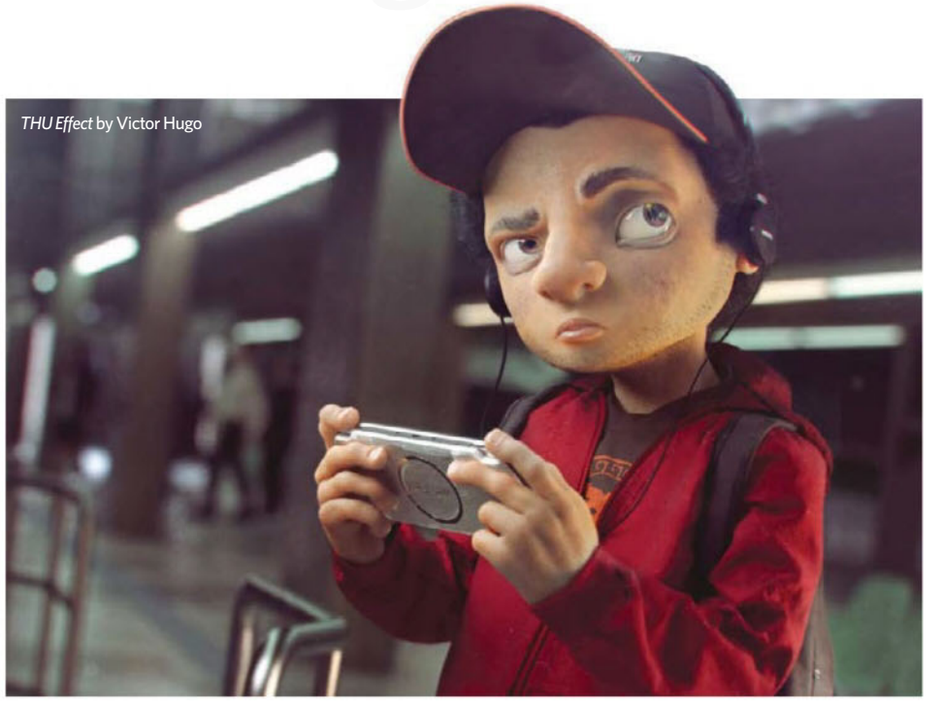
Founder of Video Copilot
WEBSITE www.videocopilot.net
BIO As a freelance artist and web designer at age 20, Andrew began to work on the Video Copilot website from his apartment in Southern California. Video Copilot has since published over 40 hours of training and the site's online presence has led Andrew to work with major companies and even Director JJ Abrams on film and TV projects

BEN MAURO
Freelance concept designer
WEBSITE www.benmauro.blogspot.com
www.artofben.com
BIO In the past year, Ben has been working on the next *Call Of Duty*, robotics design for Boston Dynamics, creature design for MPC, and three indie sci-fi films. He's also worked on *Elysium*, *LUCY*, and *The Hobbit* among others

NEIL MCCORMACK
Freelance 3D artist
WEBSITE www.bearfootfilms.com
BIO Neil's work has won multiple awards and has been featured in several issues of **3D Artist** magazine as well as other industry publications. He works in an advertising agency as well as for freelance clients, such as a high-end jewellers and an independent record label earlier this year

NICOLAS SECK
Senior animator at Double Negative
WEBSITE www.yolaman.com
BIO After studying in the graphic-novel department at Belgian school ERG, and then studying CG at France's SupInfoCom, Nicolas has worked as a character animator and senior animator for studios such as MPC, Cinesite, Framestore, The Mill and Double Negative



THU Effect by Victor Hugo

Set your rates

Advice from the experts

Take into account your work-related expenses and your living costs and try to establish a fair rate that you feel is reflective of your skill and experience, but not so high that you'll scare clients away! Sometimes if the clients are demanding a lot of difficult things, or it's a long job, you should adjust your rate to reflect that too. **Andy Hickinbottom**

When I left the Art Center, our instructors told us we shouldn't be charging less than $500 USD per day for design – 'design' meaning you are creating something new that has never been seen before. For a freelancer, that would be a good baseline for starting out, but the more experienced you are, the more you should charge. Senior designers in the game/film industry should be charging $700 to $1,000 (or more) per day depending on how qualified they are. In-house rates for employees are much lower, but the companies you work for are paying for equipment, programs and so on. Most companies have bonuses that freelancers don't get, so it kind of balances out. **Ben Mauro**

You should give a good price to get a foot on the inside, but make it clear what the product really costs and that what you're doing now is a deal to show what you are capable of. To tease possible clients, send them the very best of your work. Ask others what the best work you have is. You might have fallen in love with something you made that, actually, no one else likes! **Mats Anderson**

I would generally base my rates on a per project basis as opposed to an hourly rate. This makes the client feel generally that they are getting value for money, but it's always a good thing to be prepared to negotiate. Normally I have a figure in mind, the client has a figure in mind and in reality will settle for somewhere in the middle. **Neil McCormack**

I don't recommend doing any unpaid work, as it will diminish the global value of our jobs. Some of us have families to support and it's our common responsibility to provide the next generations with a good foundation to establish rates. **Nicolas Seck**

Complete the deal

There's no sure-fire method to make sure you're not getting cheated by who you're working for, but there are some excellent ways to decrease the possibility.

One is linked to a common mistake: not researching the potential client to find out how they have treated other artists. "Triple check with other people about the company or individual you are thinking about getting involved with before you get started," advises Mauro. "I could have saved myself from one of the worst work experiences if I had just asked some friends about the individual before blindly trusting them and getting involved in a horrible situation. Lesson learned!"

Another is perhaps even more crucial: making sure that before starting on any jobs or business ventures, all promises, rates and agreements are set out in writing to avoid misunderstandings – or even not getting paid at all – down the line.

Time is money. You have to find out how much an hour of your expertise should be worth. Take into consideration your experience/skill level. It's strange, but what we do as artist is worth more than most of us charge. **Mats Anderson**

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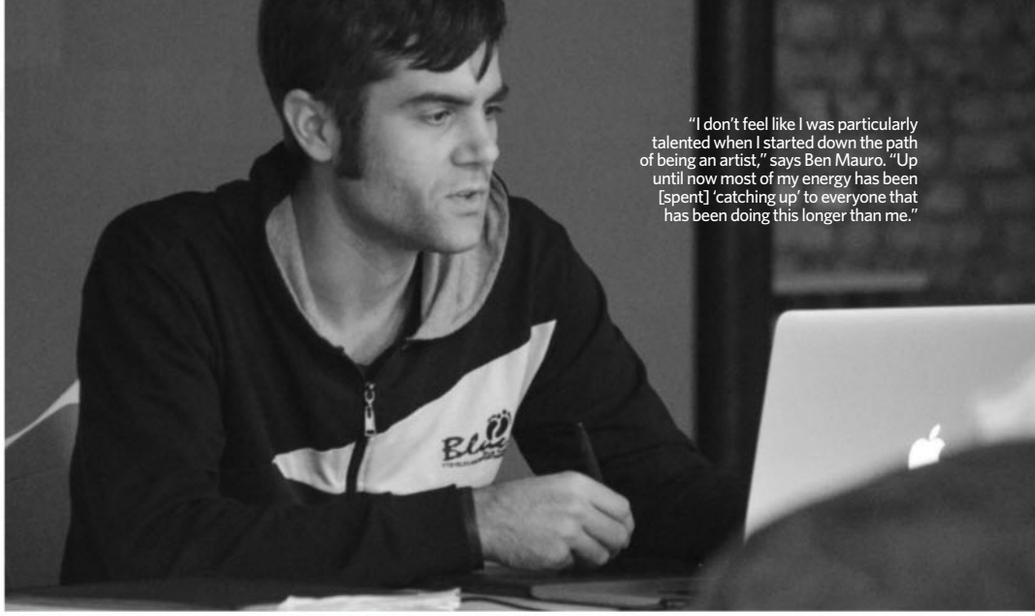

"I don't feel like I was particularly talented when I started down the path of being an artist," says Ben Mauro. "Up until now most of my energy has been [spent] 'catching up' to everyone that has been doing this longer than me."

Know your contracts

THE UNILATERAL NDA "A thing to be aware of when signing NDAs is a company will usually send you a unilateral NDA, which basically protects them and not you. Ask for a bilateral NDA, which protect them *and* you," says Ben Mauro.

PROFIT-SHARING CONTRACTS "There are many people that will try to get you to work on 'passion projects', or they will have some other innocent-sounding word for it, but it basically amounts to free work while they give you nothing. Don't do it without some form of compensation," advises Mauro. He tells us that when he can't get paid for a project, he negotiates profit sharing or even a percentage of ownership in that project to reap the rewards in the long run.

"If you are just starting out, do not depend on something like this though," Mauro warns. "Make sure you have a steady income coming in before you engage in something like this because the turnaround isn't two to three months. It's more like two to four years before anything would potentially come back to you. Ten per cent of nothing isn't going to pay the rent!"

IMAGE USAGE FORMS "I guess the one thing to make sure you are aware of is usage of the work you produce," says Neil McCormack. "Generally the client will own the work and the files associated with the work, but make sure you ask if you can reserve the right to display the work in your portfolio if possible and make sure you set a price for the work before starting it, and that it's on a signed contract. The price should be fixed and agreed before the first mouse click. "

An example of Ben Mauro's work

"Understand the level of quality that is expected and let them know how long it will take. Don't promise something you can't deliver on," tells Kramer

Link by Neil McCormack

Avoid problems

Make sure that the people you are dealing with are also the ones that will pay the bill. Do some research if you have second thoughts. Check references. For larger assignments, you need to ask for a deposit, say 30 per cent. Clients come in all shapes and forms, so be careful. **Mats Anderson**

Once you have signed a contract or you've made a deal, you shouldn't change the terms apart from exceptional circumstances. **Nicolas Seck**

Some companies will try to hire you as a contractor on employee rates, make you work in-house and treat you like an employee, but not give you any employee benefits. If you are working in-house and are not an employee, you should be getting contractor or freelancer rates. **Ben Mauro**

Something I don't do anymore is agree to a fixed rate on a job. Even if they agree up front to a set amount of changes or agree to what defines 'finished', it still ends up taking longer than expected so your rates go down. Those scenarios aren't worth the hassle; just charge a day rate. **Ben Mauro**

Earn more for your 3D

WorldMags.net

People trying to pressure you to work for exposure or some nonsense like that... we are all fully capable of promoting ourselves. Do good work and promote it as much as you can until you get the opportunity to work on a big project/game/film (or ideally create your own IP). People will really prey on the fact that you are eager to get into this industry and try to get you to work for little or nothing, which I think is a mistake. **Ben Mauro**

When freelancing, you work with many different clients from all over the world, and it's always good to know you are dealing with a client that won't screw you around and not pay up. Once I did a job, delivered the files, then was not paid. Since then, I try to get a simple contract or agreement put together and push for partial up-front payment to know that the clients mean business. Unless you are working with clients you trust or have worked with before, don't deliver the final files until you get paid. **Andy Hickinbottom**

Stand out

"The VFX industry has gone global; any animator in the world has a chance to be part of their dream projects, in their favourite companies," says senior animator at Double Negative, Nicolas Seck. "The key to standing out in the crowd is to produce quality, and that comes only with hard work"

Getting your hard work to then be seen by the maximum number of potential clients and employers is also indispensable to separate you from the competition. Knowing how to create a great 3D showreel and develop a professional portfolio website alone can go a very long way in getting your work to truly stand out.

Expert showreel tips

with Nicolas Seck

Shorter is better I think a showreel shouldn't exceed two minutes in length. The people who will review your reel probably have a hundred more reels to watch after yours, so what they want to see is what you are best at. It's better to have 30 seconds of really good shots than a few minutes of average quality.

Start with you best works Put the weakest part of your selection in the middle and finish with something great to leave with a nice feel. Some people like to put in a selection of drawings, but do it only if you are really good at it.

Be specific When you have enough material it is best to edit a demo reel specifically appropriate for the description of a job. For instance, a VFX company will be less interested by a cartoony reel even though the quality is good, or don't apply for a character-based job with a creature reel.

Using a soundtrack I like to use a soundtrack to help to unify all the shots, but it's not compulsory. I've even heard some negative responses towards watching demo reels with music, and sometimes they just switch the audio off. As a rule I would say that if you use a soundtrack, try to mute it or to reduce it a lot if you've got dialogue on so that the reviewer can appreciate your work properly. Be sure that the sound level is adjusted so you won't have sudden jumps, which would obviously be a bad experience for the ears of the reviewer.

Presentation In term of presentation, do something simple, clear and easy to read, which stipulates your name, the description of your job and a way to contact you (preferably an email address).

Try to make a breakdown of your reel Break your reel down. This is a chance for you to explain each shot further, such as what the process to achieve this result was and the impact this shot has had on your experience. If you haven't been the only artist or animator to work on a shot, be honest and explain what your part in it was.

Give out a copy of your resume Don't forget to give a copy of your resume, which should detail every relevant experience you had that could support the fact that you would be a good candidate for the company you are applying for.

Physical reels In the age of the internet, it is becoming more and more rare to have to send a physical copy of your reel out, but if you have to do so, be sure to test it on different machines before sending to be sure that it is working absolutely fine.

Put your reel online Placing your reel online is the easiest way to share it with the maximum number of people, so use a good website like Vimeo and follow its recommendations to get the best result of ratio, codec, frame rate and so on. Again, try to view it on different computers, and on different OS types if possible to avoid the unfortunate surprise of your link not working as you want it to.

Find clients

As well as a personal website and showreel, it's always a good idea to be active on dedicated CG forums, social media websites and gallery websites where you can upload your work to be seen and critiqued by peers in the industry.

"My CGSociety page is, according to the stats, one of the most viewed and followed portfolios on there," begins freelance character artist and pin-up connoisseur, Andy Hickinbottom. "My Facebook page has also taken off over the last few years. This level of recognition has really helped me when it comes to paid work."

"It's a tricky thing to get right though. Don't spam or post unrelated stuff on your page – quality of posts, not quantity," he continues. "Make work good enough to get shared and spread around. It's that simple. I get the vast majority of my job offers from people who have seen my work on these pages, so they are an invaluable tool for the artist wanting to get noticed." Of course, it's also a good idea to be prepared with the type of rates or payments you expect when you do gain somebody's attention.

"Think of it like fishing," says Mauro. "If you sit in a boat with no lines in the water, you won't catch anything, but if you cast 100 lines, something will eventually come back. Don't expect commissions to just fall into your lap. You have to work for it."

> The VFX industry has gone global; any animator in the world has a chance to be a part of their dream projects in their favourite companies. The key to standing out in the crowd is to produce quality, and that only comes with hard work **Nicolas Seck**

Starting a company

with MIR's Mats Andersen

COULD YOU TELL US MORE ABOUT YOURSELF AND ABOUT MIR AS A STUDIO?

I have been managing Mir together with my friend and co-manager Trond Andersen since 2000. We met back in Bergen National Academy of the Arts in the late Nineties. I was studying furniture design and Trond was into visual communications. Our mutual interest in photography, drawing and painting reached new levels when we got our hands on an ancient version of LightWave 3D.

WHAT WERE THE CRUCIAL ACTIONS YOU TOOK THAT RESULTED IN SUCCESS?

We have had strong opinions about the direction of the style and method. Everyday for 15 years we tried to find ways to disconnect the architects and builders from their preset presentation style and open their eyes to what we believe works better.

We also have five-day workweeks, with intense, but short workdays. We have paid overtime, weekends off, five weeks of paid holiday, a part-sponsored lunch and gym membership, health insurance (on top of the already-good health system in Norway), a fitness room, ocean view, and a good and friendly workplace. As bosses, we try to run the company as far away from a dictatorial style as we can.

We have also been hiring at a very slow rate even though the potential has been greater. The idea of not exploiting the employees, wearing them out and letting them still be playful and maintain a surplus of energy to perform is very important to us. We need to have artists that are the best.

WOULD YOU ADVISE OTHER ARTISTS TO SET UP THEIR OWN STUDIOS WITH FRIENDS?

Yes of course, though perhaps working a little first elsewhere to establish some experience is the normal way of proceeding. Sometimes a big job can kick-start your new business – in that case, use it for all it's worth and go for it!

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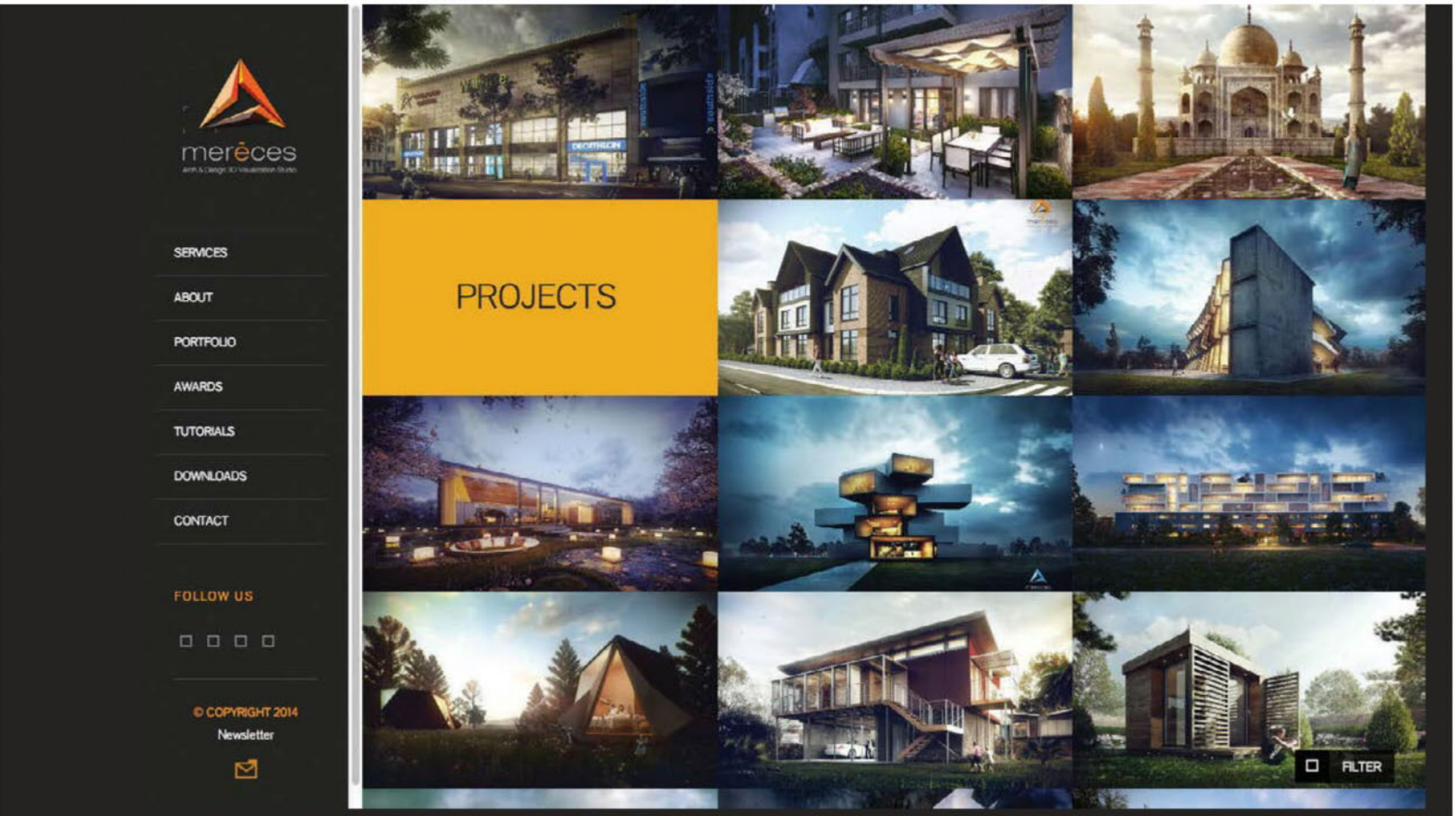

Portfolio tips from our panel of experts

- Adding a personal logo helps to build a unique brand and identity for your work, making you even more memorable for visitors.
- Keep it simple and clean when showcasing your work. There are so many portfolio services out there that offer clean templates, such as **www.cargocollective.com** and **www.squarespace.com**.
- Ensure contact details are prominent. Potential clients will be looking for a way to contact you to send their offers – an email is a huge help. It's surprising how difficult many artists are to get in touch with!
- An option to see the services an artist offers should be easily accessible and very prominent, enabling clients to immediately see what you can do.
- No fancy programming needed, no bells and whistles. Just the work and some info.
- Neat organisation of images into rows lets viewers quickly see a wide range of your portfolio with one look.
- Let it be clear that they have reached your territory and that they will most likely remember it. Dare to be different. Spend time on text quality.
- The use of neutral colours and clean fonts don't distract from the portfolio's presentation.
- Hovering over each image that gives the viewer a title and providing clickable images will enable potential clients see your work up close.
- To add more interest to your website, add in some work-in-progress images, wireframes and turnarounds. They're prefect to show off work on models and any kind of 3D work that you've done.
- If you spend ages modelling a cool character and just put it in a stiff T-pose with a blank expression, it might show off your modelling skills, but it lacks life or character. Rig it up, pose it, give it an expression and maybe put it into a scene. Make an illustration out of it. Really sell the character and its personality.

Merêces Arch-Viz is a 3D visualisation studio based in Évora and Lisbon. Award-winning 3D artist Sérgio Merêces is the studio CEO and lead 3D artist

- Originality will always be in demand. If you want people to take notice of your creativity, you have to show them something unique.
- It's cool to have a contact form, but don't forget to let people know what your email address is. Some people just don't trust contact forms.
- Don't hold back information. Always mention which software you used and share some background info, such as wireframes or WIPs. Sometimes showing how you created a piece of work can be really important for a client.

Seck worked on *Narnia: Prince Caspian* for Framestore

Sheep Intrusion by Mats Andersen

LYCON Worship by Ben Mauro

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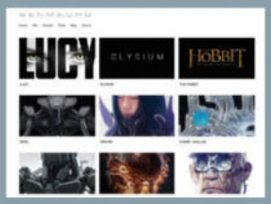
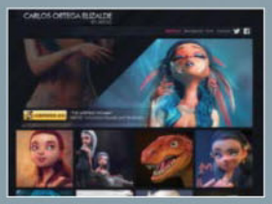
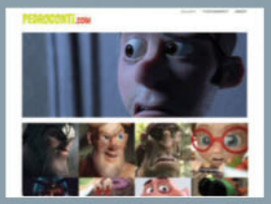
Top ten artist portfolios



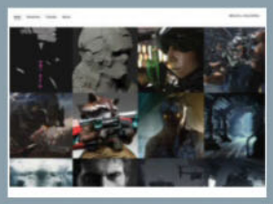
Ben Mauro
www.artofben.com



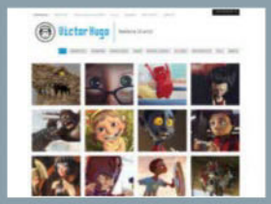
Carlos Ortega Elizalde
carlosortega.prosite.com



Pedro Conti
www.pedroconti.com



Maciej Kuciara
www.kuciara.com



Victor Hugo
www.vitorugo.com

Essential websites

For showing off your work

www.artstation.com
www.behance.net
www.cgsociety.org
www.zbrushcentral.com
www.3dartistonline.com/galleries/latest
raw.abduzeedo.com
www.deviantart.com
www.evermotion.org
www.cgarchitect.com

For networking (social media and forums)

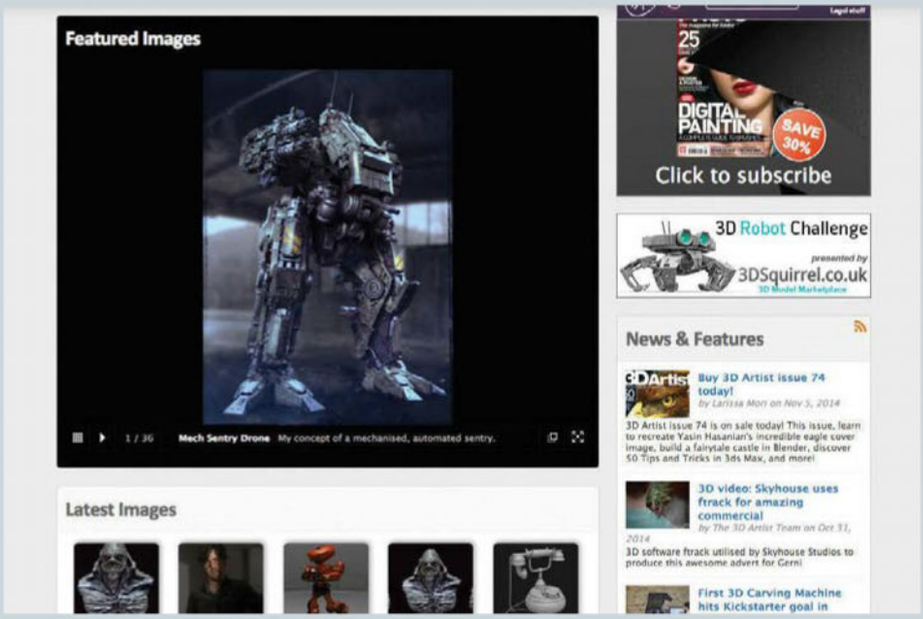
www.linkedin.com
www.facebook.com
www.twitter.com
www.pinterest.com
www.tumblr.com
www.polycount.com/forum
www.cgtalk.com
www.gameartisans.org

For industry news

www.3dartistonline.com
www.vfxsoldier.wordpress.com
www.animationguild.org
www.cgchannel.com
www.cartoonbrew.com
www.3dtotal.com
www.fxguide.com

For tutorials

www.blenderguru.com
www.digitaltutors.com
www.thegnomonworkshop.com
cgi.tutsplus.com
area.autodesk.com/tutorials
www.videocopilot.net/tutorials
www.cgcookie.com
www.11secondclub.com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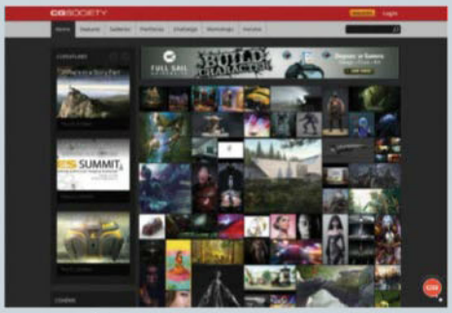
First 3D Carving Machine hits Kickstarter goal in

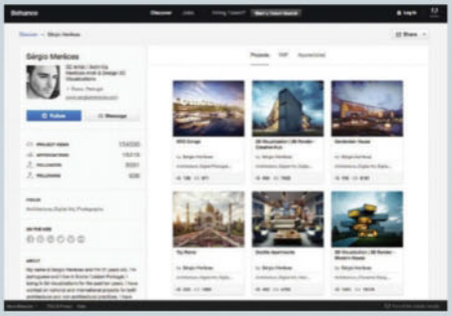
www.3dartistonline.com/galleries/latest

www.videocopilot.net/tutorials



www.cgsociety.org

www.3dtotal.com



www.behance.net

*Always remember

Remember that you should always check each website's terms and conditions before you upload your original work to the website. "If you're posting something on Facebook, you will be sharing your rights with Facebook to that character," explains author and visual arts consultant, Alison Branagan. "On Instagram and Facebook you automatically issue a universal licence to Facebook for them to use your images in the future. You're actually sharing your copyright with an organisation."

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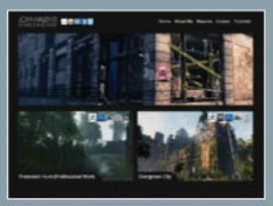
Tian Cocker
www.tiancocker.com

Lee Griggs
www.leegriggs.com



John Valenti
www.johnvalentiart.com

Leticia Reinaldo
www.leticiareinaldo.com

Tomas Kral
www.tomaskral.cz

You need to be a professional by not getting too emotionally attached to your work, as you will certainly have to redo your shots several times. It might be given to another colleague in order to help finish the project on time
Nicolas Seck

"I love cartoons, pin-ups and the female form, and I became recognised for my work in this field early on," says Hickinbottom. "I spend a lot of my free time being productive with personal work, as it is my main outlet for my inspirations, and has got me out there and known"

WorldMags.net

Technique focus

Incredible 3D artists take us behind their artwork

ENVIRONMENT I'm interested in the culture and history of Japan and I wanted to create a picture that shows the character of this country. Based on photos and my own imagination, I built Cinema 4D models of the buildings and the environment. After rendering in V-Ray, the last step was post-production where I added the sky, humans and birds. **Symbols of Japan,** 2014

Artur Adamczyk

Website www.adamczykarts.com
Country Poland
Software used Cinema 4D, V-Ray, Photoshop
Bio An architect by trade, Artur has been running his own small company as a 3D artist

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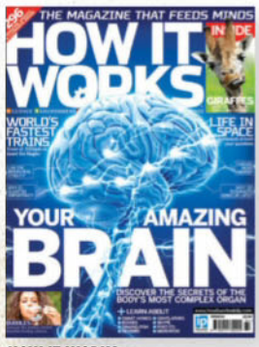

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Six 4K displays are supported, but only three can be used at 60 Hz simultaneously

Sapphire FirePro W8100

AMD's second-fastest graphics card is great value for money

REVIEW BY Orestis Bastounis, technology writer, UK

Earlier this year we tested AMD's FirePro W9100 Hawaii XT GPU, which delivered greatly improved specifications and performance over its predecessor, including a doubling of the on-board GDDR5 graphics memory. AMD has now updated the rest of its professional cards, spearheaded by the FirePro W8100, based on the Hawaii Pro design, which arrived in our labs this month in the form of a retail card, manufactured and packaged by partner Sapphire Technology.

We reference the earlier, more powerful, FirePro card because the W8100 appears to be a slightly cut-down, but far more affordable version of it. Interestingly, although some specifics of the card are indeed reduced compared with the W9100, such as the memory capacity of 8GB, others are identical, including the 512-bit memory bus and 64 ROPs. This ensures the all-important memory bandwidth remains at 320GB/sec, enough to keep colossal amounts of polygons, scenes and shaders flowing to the card's processors.

The W8100 has a core clock speed of 824MHz, a small downgrade from the 933MHz in the W9100. Its 2,560 stream processors are also slightly fewer, down from 2,816. Overall the card offers 4.2 teraflops of graphics performance, around 20 per cent less than the 5.2 teraflops that you get with the W9100. It's worth noting this is still more than the four teraflops offered by last generation's top-end FirePro W9000 card.

Six 4K displays can be powered from a single card, although only three of these can operate simultaneously at 60Hz, leaving the rest at only 30Hz (when running at 4K). There are four full-sized DisplayPort 1.2 outputs on the card, with a stereo DIN connector for an MST hub to provide the remaining two.

Two six-pin power connectors on the card are a reduction from the six-pin and eight-pin connectors required by the W9100, with the card drawing 180W in total.

There's no denying that the W8100 is a formidable graphics card, and it requires an equally beastly computer to feed its voracious appetite for data. This is why Scan Computers helpfully sent us its 3XS GW-HT20 workstation to test it in.

Of note is the Core i7 5960X eight-core Haswell-E processor, a brand-new addition to Intel's desktop processor line, overclocked to 4.2GHz, along with 16GB of DDR4 memory, which runs much faster than DDR3.

GPU performance really benefits from high clock speeds, which is why a Core i7 chip can often drive graphics better than a Xeon can. This is more limited in thermal headroom since so much silicon is devoted to providing additional cores.

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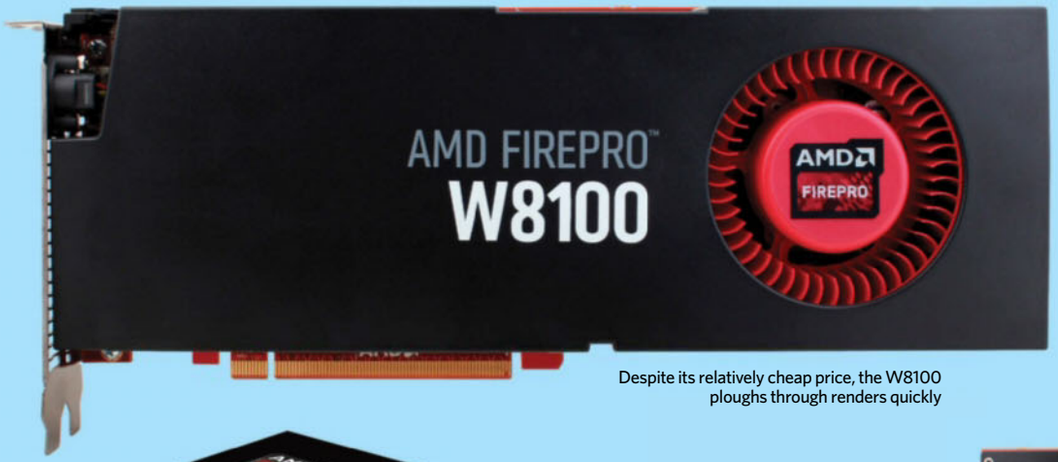


Despite its relatively cheap price, the W8100 ploughs through renders quickly

Essential info

Price: £1,500 / $2,499 US

www.amd.com/en-gb/products/graphics/workstation/firepro-3d

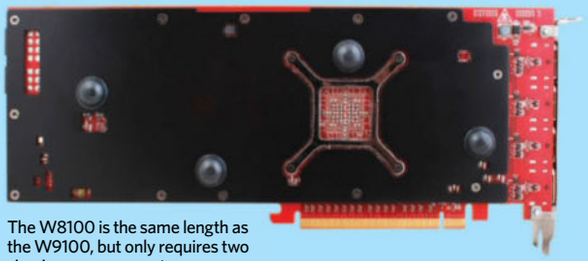
OPERATING SYSTEMS

- Windows 7, Windows 8

OPTIMAL SYSTEM REQUIREMENTS

- 8 GDDR5 ECC memory
- 824 MHz core clock speed
- 2,560 cores
- 160 texture units
- 64 ROPs
- 220w TDP

Sapphire's relationship with AMD is well-known, but the company only started manufacturing FirePro cards last year



The W8100 is the same length as the W9100, but only requires two six-pin power connectors

The good & the bad

- ✓ Great (relative) value for money
- ✓ Slim performance difference with the W9100 card
- ✓ Strong graphics performance
- ✓ Strong OpenCL compute performance
- ✗ Still a pricey graphics card for home users
- ✗ Only half of the 4K display outputs are capable of 60 Hz simultaneously

The W8100 retails for £1,500, almost exactly the same price as Nvidia's Quadro K5200 GPU, putting the two in close competition for a place in 3D studios. A potential deciding factor could be AMD's support for OpenCL on-GPU computing, which traditionally performs better on FirePro cards than Quadros. The reasons are political – Nvidia favours its own Cuda standard, but software support now seems to be edging slightly in favour of OpenCL for parallel 3D and graphic design tasks.

In our tests, we saw results that correspond with the W8100's reduced specification compared with the W9100 – slower, but still fast enough to make it excellent value for money in the high-end GPU market. In the synthetic Luxmark Room OpenCL benchmark, the W9100 in Boston's Venom 2301-7T scored 1390. The W8100 managed 1170.

In SPECViewPerf, the Maya scores in particular always shine on AMD cards, so it makes sense to recommend FirePro hardware if Maya is your preferred design tool. Thanks to the new technology driving the W8100 in Scan's GW-HT20 workstation, the card managed 76.75, the highest score we've seen. In fact, the results were only between five and ten per cent lower than the W9100 in all tests, a great result for a graphics card that is just about affordable for home users – not just for professionals, as the W9100 is.

In the seemingly never-ending rivalry between AMD and Nvidia, both have made the same moves in 2014, evolving rather than replacing their existing workstation GPU designs with more memory and more compute performance. The W8100 is a smashing card, offering enough performance to perform background rendering and design work simultaneously, without skipping a beat.

Our verdict

Features	8/10
Performance	9/10
Design	8/10
Value for money	10/10

> With the FirePro W8100, you get about 80 per cent of the performance offered by its bigger cousin for half of the cost

Final Score 9/10

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Autodesk Smoke 2015

With its latest upgrade, Autodesk is aiming to establish a Smoke-only post-production pipeline, but is it worth it?

REVIEW BY Tom Magill, lecturer in VFX for screen and media at AIE, Australia

In the past, Smoke has often been seen as a VFX support for its bigger brother, Flame. The idea that drives current development is to service an independent user base. As such, Smoke is marketed as a standalone finishing tool where editing, conforming, effects and final grade are done in a single program. To increase accessibility for freelancers, the price has come down considerably – the perpetual licence is gone, and it is now offered as a monthly, quarterly and annual term-based software rental plan.

For Flame users, the tools of Smoke remain available in the guise of what's now called Flame Assist. In the future, we can expect Smoke and Flame Assist to keep sharing common components, but ultimately they will keep diverging.

Smoke performed well when importing multi-channel OpenEXR files. I'm a big fan of RLE compression and it's great that Smoke's OpenEXR export now offers RLE. PSD files with transparent layers import fine, as do files with a single Alpha channel. On the negative side, however, Photoshop layer masks are not supported yet. Importing an edit from Final Cut Pro X into Smoke worked without a hitch, but you must have Service Pack 2 installed.

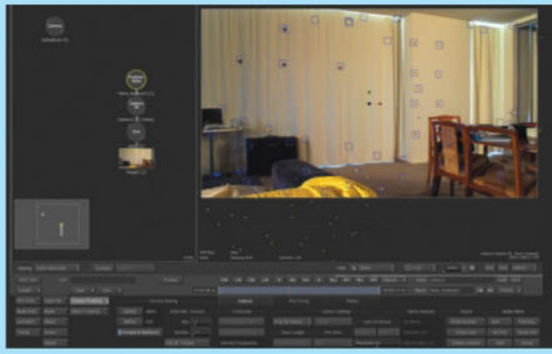
Timeline FX allows users to add common effects directly on the Edit timeline and then have quick access to popular adjustments. Created effects can be shared among clips, and if you need to go into more depth you can take a Timeline FX clip over to Smoke's ConnectFX for procedural compositing.

When working in ConnectFX and the timeline, you immediately get real-time feedback. Timeline FX is now GPU accelerated, removing the need to render a segment, and I enjoyed instant playback.

Testing the new 3D Tracker, the nodal network for the Action 3D space might take some time to make sense, but the tested track became accurate with only a few adjustments. The training videos on the Smoke Learning channel provide a quick entry into new features.

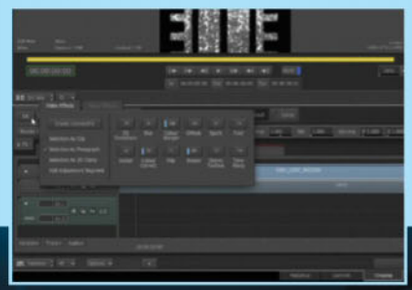
It will be interesting to observe how Smoke 2015 fares as a standalone finishing tool now that The Foundry has released its competitive NUKE Studio. The slightly different user base for the two applications will hopefully see both be successful in their respective fields where Smoke can continue to support the broadcast graphics market.

For anyone wanting to try Smoke, there's a free 30-day trial available, and for those keen on learning more, Autodesk maintains the Smoke Learning channel on YouTube.

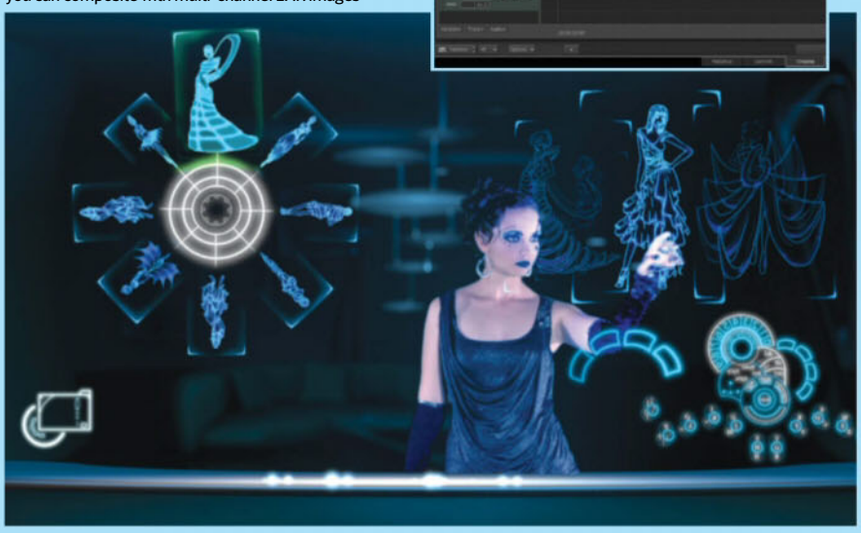


Using the new 3D Tracker on a busy backplate gives stable results after only a few iterations of the ConnectFX Analyzer

Timeline FX are now consistent with their ConnectFX node equivalents. This means their menus, functions, performances and outputs are identical between the Timeline and ConnectFX



Once you have loaded your images into the Media Hub you can composite with multi-channel EXR images



Essential info

Price: £160 / $185 monthly
£400 / $460 quarterly
£1,280 / $1,470 annually

www.autodesk.com/products/smoke

OPERATING SYSTEMS

- Apple Mac OS X version 10.7.5 or later, 10.8.x or 10.9.x

OPTIMAL SYSTEM REQUIREMENTS

- Apple iMac, MacBook Pro, Mac Pro (2013 or later)
- 64-bit Intel multi-core processor
- 8GB of RAM (16GB or more recommended)
- 3GB free disk space for download & installation
- Minimum 1440 x 900 display (1920 x 1200 or higher recommended)

The good & the bad

- ✓ All-in-one post-production and finishing package
- ✓ Easy access to effects on the timeline
- ✓ Price has come down significantly
- ✓ Compatible with Mac Pro
- ✓ Solid amount of resources available for beginners
- ✗ Only available for Mac OS
- ✗ No particle systems
- ✗ Comprehending the UI can be difficult for beginners

Our verdict

Features	8/10
Ease of use	8/10
Quality of results	8/10
Value for money	9/10

"Some good additions to a stand-alone finishing tool for freelancers"

Final Score 8/10

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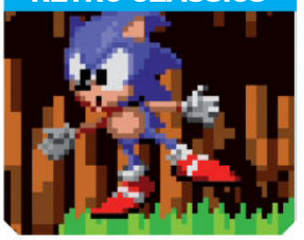

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Mark Van Haitsma

The senior hard surface artist at Bungie reveals how he helped develop the weapons and tech of *Destiny*

inside

"I think every model is its own challenge. It's sometimes hard to get over the hurdle where you find yourself starting over again"

Mark Van Haitsma, Page 94

Dawn of the Iron Blade

Senior artist at Bungie Mark Van Haitsma has worked on the art of everything from *Mass Effect 2* to *Destiny* and the upcoming *Doom 4*

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KeyShot for ZBrush will be activated inside ZBrush when an artist is ready to set lighting and materials

KeyShot 5.1 released

Luxion updates KeyShot 5 ready for a new partnership with Pixologic

After having first released KeyShot 5 in May, Luxion has now updated its real-time ray-tracing and Global Illumination program with KeyShot 5.1. An expanded array of features includes Pattern updates so that users can not only Pattern separate instances of models for quick copying, but can also edit Pattern, set Scattering and automatically Adjust Camera to fit patterned parts.

Also new are six KeyShot procedural textures including Camouflage, Spots and Wood Adv, the ability to add saved Cameras and Viewsets directly to the Render Queue for a faster workflow, and exclusive access to the full line of beautiful leather materials from world supplier of high-quality leather hides, Sørensen. The new KeyShot materials allow colours and textures to be matched exactly with the hides and viewed under different lighting.

The new update also adds extra support and cross-platform capabilities. When running natively on Mac OSX, KeyShot 5.1 includes Retina Display support for all Apple displays. Meanwhile, for Windows, the new renderer also includes full support for devices with a multi-touch interface.

KeyShot 5.1 is available immediately for download as a free upgrade to all customers with subscription and starts at $995. For more information, visit www.keyshot.com.

Cinema 4D users will also now be able to use KeyShot with v5.1, which adds direct support via KeyShot's direct import to the software

Luxion & Pixologic

Earlier this year Pixologic and Luxion also announced a new KeyShot integration for ZBrush 4R7. KeyShot for ZBrush will have all the features of KeyShot HD, designed exclusively to work with the ZBrush-to-KeyShot bridge – which will send data from ZBrush to KeyShot. KeyShot for ZBrush will be available at an introductory price of $249 and a list price of $349. If you already have KeyShot, you can also choose to purchase the bridge separately for $99 (list price $199) to bring the capabilities into ZBrush.

● **HAVE YOU HEARD?** • Disney has announced a 2016 release for its next animated feature, *Moana*

UK schools' lack of tech

Autodesk's study shows students lack technology

Autodesk has announced that after asking 1,000 schoolchildren in the UK what they want to be when they grew up, 52 per cent wanted to pursue a career in STEAM (science, technology, engineering, digital arts and maths) related industries. In comparison, only two per cent said prime minister, while 13 per cent wanted to be a celebrity.

However, the company also found that 57 per cent of the students said that lack of access to technology was stopping them from using more of it in the classroom, while 33 per cent didn't feel their school knew enough about new technology at all.

"We've heard for a long time about a growing STEAM skills gap in the UK, but this research shows a real enthusiasm for careers in these industries among the next generation," explains Pete Baxter, vice president and head of Autodesk UK. "We should be doing everything we can to nurture this enthusiasm within our classrooms so that we can develop the skilled workforce we need to succeed in the future."

The study comes right after Autodesk's latest announcement that its desktop software will be free to students, teachers and schools worldwide with no country restrictions, as has been the case in the past.

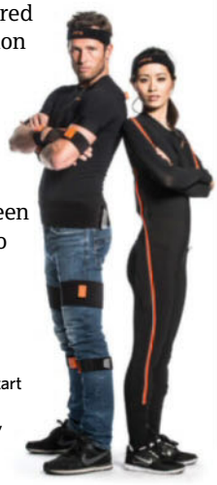
AUTODESK.

For more information on accessing a free desktop version of Autodesk's software, visit the website at **www.students.autodesk.com**

XSens reveals MVN suite

The redesigned mo-cap line is priced at 75 per cent less

Leading motion-tracking technology innovator Xsens has unveiled a new wearable mo-cap product line with huge enhancements in faster setups, cleaner data, and tougher materials as well as price. The two new redesigned systems include MVN Link – Xsens' full-body, cameraless mo-cap suit with reinforced wires, smaller trackers, and an increased battery life of over nine hours – or MVN Awinda, a strap-based system with no suit required and wireless motion trackers for recordings of over six hours. Xsens'software package, MVN Studio, has also been updated with a 4.0 version, and can now track height in real-time.



Prices for Xsens MVN start at $12,000. To find out more about the new line, visit **www.xsens.com**

VFX back in California

The state aims to lure back VFX jobs and industry that has long since left LA

Los Angeles mayor Eric Garcetti predicted that the new credit would allow 10,000 jobs to return to the region within the next year

Governor Jerry Brown has signed a new legislation aimed to stop the flow of production and VFX jobs leaving California to go to other countries with better subsidies, such as Canada or the UK. The state's new Film and TV Tax Credit Program will more than triple in size to an annual $330 million in incentives over five years, and goes into effect in 2015-2016. A part of this will be going directly towards extra incentives for visual effects work, though only the first $100 million of any production's budget will be applicable for the tax credit.

Software shorts

Bringing you the lowdown on product updates and launches

V-Ray 3.0 for Maya

Chaos Group announced the release of V-Ray 3.0 for Maya, which was developed with artists and studios. Key features include faster ray tracing, quicker feedback through a new Progressive Image Sampler, and optimised shading and rendering with support for subsurface scattering with object-based and ray-traced illumination. V-Ray 2.0 upgrades start at $420/€300/£260 and the full workstation licence price starts at $1,040/€750/£650.

Substance Painter 1.0

Allegorithmic has officially shipped the latest version of its award-winning 3D painting application, Substance Painter 1.0, bringing a new UI, 4K support and the ability to load custom shaders among many other new features. Substance Painter 1.0 is available now for both Mac OSX and Windows at $149 for independent artists and $590 for a pro licence. See more at www.allegorithmic.com/products/substance-painter.

Affinity Designer Trial

AFFINITY DESIGNER

After a multitude of user requests and a hugely successful launch on the Mac App Store in October, Serif has announced a new free-trial version of Affinity Designer for any potential buyers to try. The trial, which is a full version of Affinity Designer with no restrictions or watermarks, will be available to users for ten days from the company's website. To buy the vector illustrator after the trial, visit www.affinity.serif.com/buy-designer.

New NUKE range

The Foundry's release includes NUKE STUDIO plus a free version of the tool

The full pricing range can be found online at **www.thefoundry.co.uk/nuke/pricingandlicensing**

Now available from The Foundry's website, the new NUKE 9 release brings in exciting pricing changes along with many updates and features. The new addition to the range is NUKE STUDIO, which will combine both a timeline and node-graph workflow so that artists can composite as well as edit their film. Other features include Soft Effects, nodes that can be added to the timeline to create quick fixes, as well as real-time 4K playback.

The Foundry also revealed the release of a free version of NUKE for anyone not working commercially. Available from 2015, it will have most features and no watermarks.

DID YOU KNOW? ▪ Recently released documents revealed that *John Carter* cost the Walt Disney Company $306.6 million

Studio Access

Glassworks

Founder and director of Glassworks Alastair Hearsum tells us more about how his intimate team keeps creating such stunning projects

GLASSWORKS
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One of the top effects and animation companies in London working in the TV, advertising, and music video sectors. The studio also has diversified into directing, animation production and special projects such as medical simulation, projection and other R&D endeavours

www.glassworks.co.uk

Locations UK, Holland, Spain
Software Softimage primarily, Flame, NUKE, Baselight

In 1999, a music video was released that is considered a milestone in computer animation, even today. Directed by Chris Cunningham, Björk's *All Is Full Of Love* featured everything from incredible robots with realistic facial expressions to a backward rush of water, and became acclaimed with a variety of awards as one of the best music videos of all time, as well as becoming part of the permanent exhibition at the Museum of Modern Art in New York City. The studio of artists behind the CG: Glassworks.

"I was there when the doors opened," tells director of Glassworks and head of 3D at the London studio, Alastair Hearsum. He first met founder Hector McLeod at another company, Complete Video, in the early Nineties. "I was straight out of college and straight into a nightmare," Hearsum remembers. "Matt Forest, the director, had a reputation for being, shall we say, tricky, and I had my first taste of 15-hour days and 'I want, I want' clients."

Eventually, McLeod left Complete Video to help run animation studio Click 3x in New York, setting up one of the first Flame-based compositing workflows at the time. In 1996, however, he returned to London. After persuading Eidos, the games company famous for *Tomb Raider*, to help fund his own start-up, Glassworks was born.

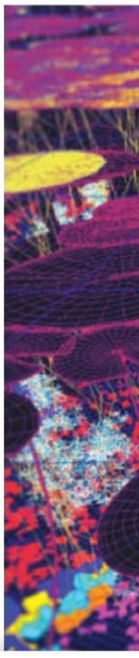
"I've only worked at two places. Glassworks and Complete Video," Hearsum reveals. "Whenever I moan about the conditions we work under, Hector always says that things have always been the same. To a degree they have, but the budgets are smaller, the clients more demanding, the competition greater, the quest for quality even greater. The power and capability of computers and software has increased enormously, but we are always pushing the envelope in terms of quality and scale so we still fight among ourselves for render time. Instead of fighting over a four-processor silicon graphics computer, we just fight over our 60-node render farm."

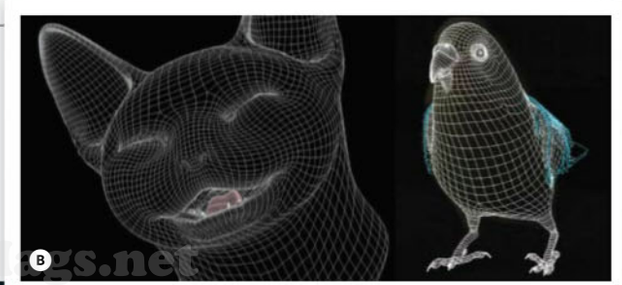
> "Whenever I moan about the conditions we work under, Hector always says that things have always been the same"
> **Alastair Hearsum, Founder/director of Glassworks and head of 3D in London**

He explains that it was Hector's sense of adventure and willingness to take part in unusual projects that led to collaborations with the likes of Chris Cunningham, or ventures such as Heartworks – an anatomically accurate virtual heart for teaching cardiac anatomy to surgeons which was developed after a chance conversation at a dinner party. The company even launched its Barcelona studio branch right in the middle of a recession.

"Every project is different. Fundamentally we use Softimage and Flame augmented by Fume FX, Maya PFTrack, Marvelous Designer, ZBrush and Mudbox,"

A

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Contributor

Alastair Hearsum
Founder/director of Glassworks and head of 3D in London

Portfolio highlights

Here are some of the big projects Glassworks has worked on:

2014 *Freeview - Love*
2014 *Freeview - Pondview*
2014 *Lycra - Lycra Moves You*
2014 *X-Pollination - Alaska*
2013 *G-Star - Art of RAW*
2012 *TalkTalk - Model Britain*
2010 *Guinness - Home Grown*
2007 *Bank Of Ireland - Dragon*
2006 *Sprite - All Nighter*

A A new development for the team at Glassworks is the Redshift GPU renderer. It's been said that this brand-new renderer can cut render times by an astonishing factor of up to 40 in some cases

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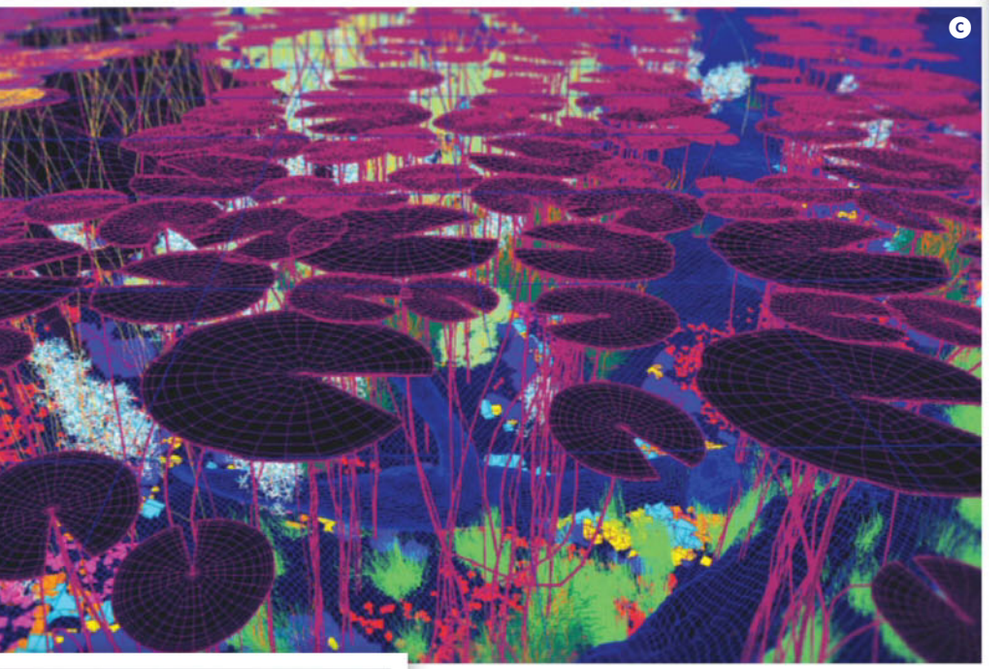
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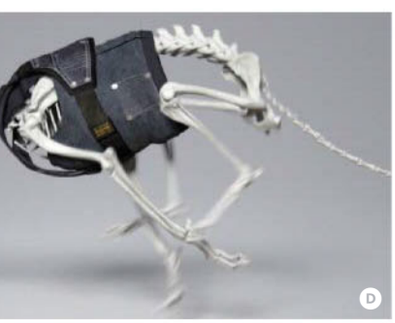
E

explains Hearsum, who tells us Glassworks was one of the first studios to adopt Arnold as a renderer, and is now using GPU-based renderer, Redshift. "We also use our own proprietary LUTs to enable us to exactly match the response curves of various real-world cameras like ARRI and RED. It makes a huge difference in how our work looks."

The small team knows how to have fun too, though. "We have our legendary Christmas parties at Gunthorpe Hall, a country house in Norfolk. It's in the middle of nowhere and we spend the weekend there having the whole place to ourselves," Hearsum continues. "One of the highlights is a three-in-the-morning mass naked swim in the stinking-dark lake in the grounds of the house."


D

B The 3D department at the London Glassworks office can expand from around 11 to over 20 artists when the team is busy. "Freelancers tell me that working at Glassworks is fantastic," states Hearsum

C "We take great care in who we employ," reveals Hearsum. "They have to feel right to us, we have to feel they'll fit in. Sometimes we make mistakes and get jobsworths or uptight competitive types"

D Hearsum explains that it's possible to be taken on as an intern and with the right skill and attitude, be involved in frontline work. This was the case with head of 3D in Amsterdam, Ruediger Kalthenhauser

E Work for Pondview, 2014. Hearsum says that the way the team deals with such a diverse set of requirements with every project is to have people with generalist skills, often coming from very small studios

F Work for Lycra Moves You, 2014. "As for the clients, I think we appeal to a particular type of person who appreciates the scale we are at, the friendly, accessible vibe and the lack of corporate structure," Hearsum says

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Industry insider

Mark Van Haitsma

Senior artist at Bungie – hard-surface artist

Behind the scenes at Bungie – how artists like Mark brought the Destiny developer's next-generation vision to life

About the insider

Job title Senior artist at Bungie – hard-surface artist

Location Bellevue, WA

Website www.monkeyhertz.com, www.artstation.com/artist/mvhaitsma

Biography Mark's early doodles of skulls and aliens soon turned into something more complex, when he found himself enjoying Mechanical Drafting at school. His enjoyment of drawing machine parts led to his career as a hard-surface artist. "Although I don't have a fine-art background, my love for videogames and movies has allowed me to make a successful career for myself," he says

Destiny was released in September to a Bungie fanbase that had been starved of content from the developer for a long four years. The game that they eventually received may not been the direct descendant to *Halo* that they were anticipating, but it was absolutely delivered in Bungie's traditional brand of sci-fi – where sci-fi novella cover vistas represent the backdrop for the battling, armoured knights of the future.

This vision was brought together by a huge team at Bungie, containing hundreds of artists like Mark Van Haitsma. Van Haitsma had been training for the role for years. "Growing up with two brothers, I ended up playing my share of videogames," he explains to us. "The first time I wondered if I could possibly do this for a career was when I played *Resident Evil* – that series influenced me greatly. I ended up going out to Arizona with my brother to attend the University of Advancing Technology, where I got a degree in Digital Animation Production."

Van Haitsma initially wanted to work on animated feature films, but soon found himself drawn back into the world of videogames. "I previously worked for Rainbow Studios in Phoenix, Day 1 Studios in Chicago and id Software in Texas. I hopped around mainly to see what was out there, and what kinds of projects would be cool to work on. Bungie naturally caught my attention and I was lucky enough to come here to be a part of such an amazing team."

Read on to learn about Van Haitsma's role at Bungie and the work that goes into the creation of a game as large and ambitious as *Destiny*.

What are your digital art tools of choice, and why do you opt for these?

Lately I have been using KeyShot for my rendering. It was a quick and easy way to get beautiful renders during the production of *Destiny*, whether it was to aid in art reviews or just to have some cool portfolio pieces for myself. I find that I can get an amazing result very quickly without the need to set up an elaborate scene.

How do you go about designing a piece of technology or a weapon in 3D?

I'm usually handed a concept piece from one of our amazing concept artists and my first goal is to get a block-out mesh together as fast as possible to see if and how the design can function in-game. Usually there is some back and forth on the mesh to get it to where everyone involved is happy with it.

With a gun, for example, I'm most concerned with silhouette and how interesting it looks in first-person. Most weapons will always look good from a profile view, but it's another beast to get it to feel right in first-person view. I then make sure it fits with the animation rig for that particular class of weapon.

Once everyone signs off on the block out, I proceed to the high-poly work and make it look pretty.

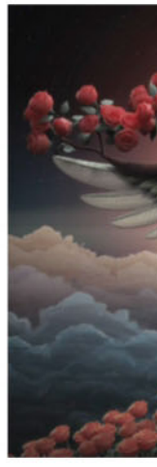
What challenges do you encounter working as a digital videogame artist today?

I think every model is its own challenge. It's sometimes hard to get over the hurdle where you find yourself starting over again, and again, and again. Every weapon and vehicle has its own set of unique challenges and I have to make sure to keep them all at a quality level that I'm content with.

There are a lot of talented people out there, and I want my work to be on par with that talent. Keeping this in mind, I try to motivate myself every day to make sure every task has importance.

What are the most important lessons you have learned during your time as a digital artist in the videogame industry?

I think one of the most important lessons I have learned



Portfolio highlights

Some major projects that Mark Van Haitsma has worked on:

TBC *Doom 4*
2014 *Destiny*
2011 *F.E.A.R. 3*
2010 *Mass Effect 2*
2009 *The Beatles: Rock Band*
2008 *Fracture*
2006 *Cars*

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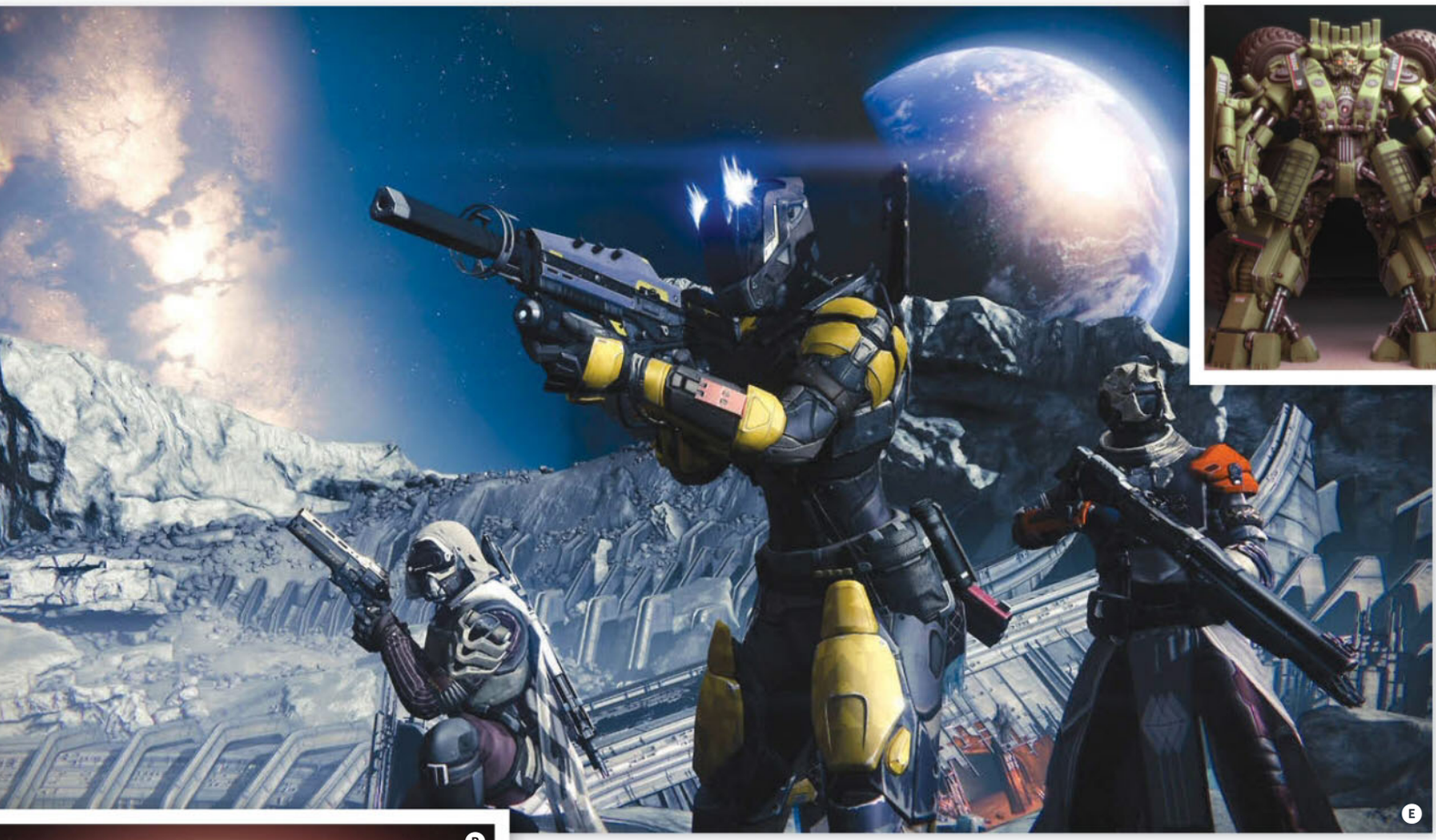

D

B

C

Cutting your wolf loose

Mark discusses how 3D art, even on a multi-million-dollar project like Destiny, can be a fun and freeform affair

"The wolves that are on the Gjallarhorn rocket launcher in *Destiny* started off as a joke. I saw a cool chest piece that fellow artist Mike Jensen was working on one day and asked him for the wolf head mesh that was on it. I had a base style already laid out for the Gjallarhorn, but needed to take it further, and I thought it would be funny to shove wolf heads everywhere and get a good laugh. I was really just messing around and never thought it would get approved."

over time was to get comfortable with the fact that I am indeed a production artist, and that my time is valuable. I try to find the quickest way to do something, while still feeding that creative itch.

As a production artist, I have to find a good balance of ownership. Usually when working at a large studio, work changes hands frequently and I have to set my pride aside every now and then for the good of the project. Models often change based on the current needs of the project, and sometimes schedules don't line up and I'm not the one making those changes.

There are also times where work will never see the light of day, for various reasons. I have to be comfortable with the fact that some of my hard work will never be seen. Considering the amazing job I have and what I get to experience every day, I can't get too hung up on all that.

A *Destiny*'s sci-fi roots can be traced back to 1994 PC shooter *Marathon*, but its chunky brand of genre-defining sci-fi was brought to the fore in 2001's *Halo: Combat Evolved*

B "The idea that millions of people will see art in a game that I helped create is extremely humbling and also pretty scary at times," enthuses Van Haitsma

C Bungie's concept department sends designs for Van Haitsma to flesh out in 3D. Developers have a very defined aesthetic sense that stretches back to the days of *Halo*

D When it comes to modelling, Van Haitsma has used 3ds Max his whole career. "Every studio I've worked for used Max in its pipeline. I find that it does everything"

E Bungie's latest game is *Destiny*, a shared-world shooter that takes place across Earth, the Moon, Mars and Venus. It has been praised for its brilliant graphics

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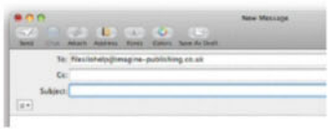

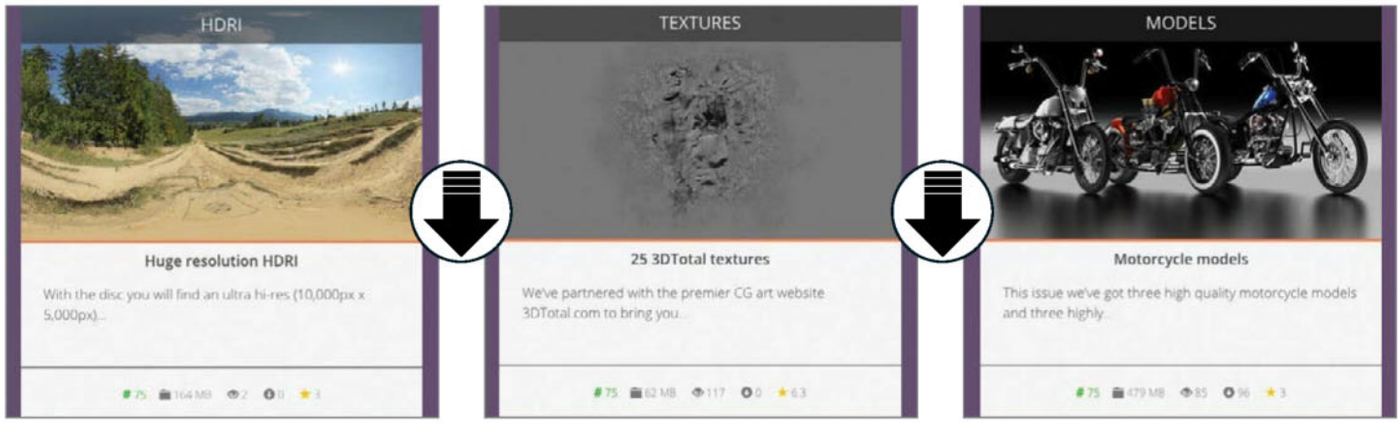
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Motorcycle models
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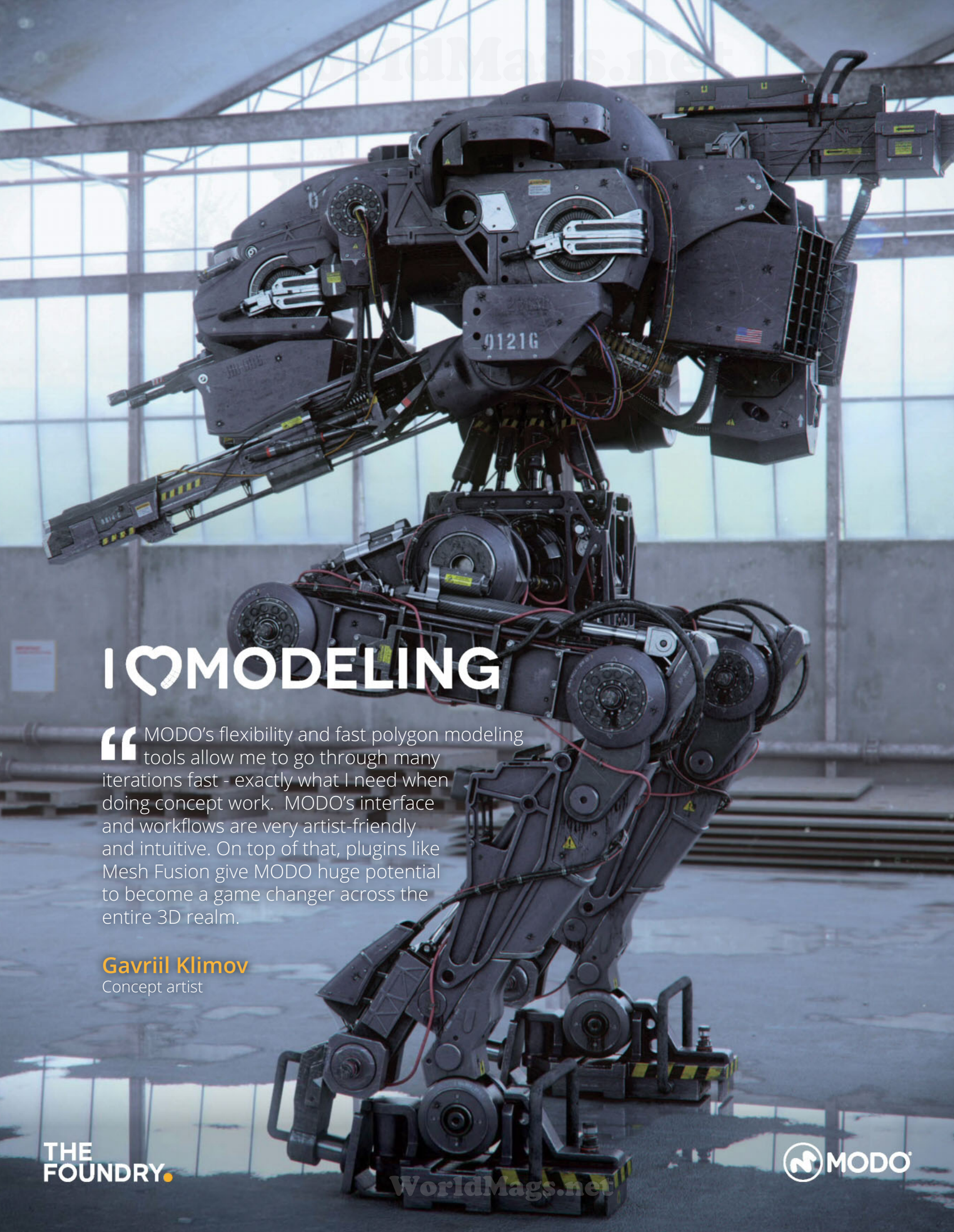
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